
Autodesk® PowerMill® 2018

What's New



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Summary of new features

PowerMill is the leading NC CAM software specialising in the manufacture of complex shapes typically found in the toolmaking, automotive, and aerospace industries. PowerMill 2018 offers all of the original features of PowerMill 2017, but with numerous improvements. This document describes the most significant improvements.

PowerMill 2018 contains the following new features and enhancements:

User interface

- Ribbon interface (see page 3)
- Quick Access Toolbar (see page 7)
- Expanding tooltips (see page 8)
- Colour scheme (see page 10)

Turning

- Toolpath connections (see page 11)
- Toolpath editing (see page 12)

Generating toolpaths

- Dynamic machine control within a region (see page 13)
- Modifying the feedrate for specific toolpath regions (see page 14)
- Blisk tool-axis controls (see page 15)
- 3D Offset Centreline (see page 16)
- Feature machining strategies (see page 18)
- Stock-collision detection for feature machining (see page 18)

Simulation

- Dynamic stock-collision detection (see page 21)

Additional changes ([see page 22](#))

Where's my command? ([see page 23](#))

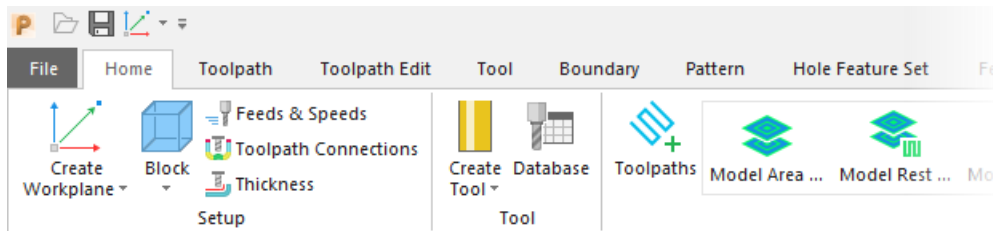
User interface

There are improvements to the user interface in PowerMill 2018:

- Ribbon interface (see page 3)
- Quick Access Toolbar (see page 7)
- Expanding tooltips (see page 8)
- Colour scheme (see page 10)

Ribbon interface

The toolbar and menu options have been replaced with a ribbon to give PowerMill a clear visual layout and provide consistency with other Autodesk products.



Tabs

Select a tab to make it active and display the buttons on that tab:

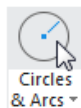
- **File** — Use this tab to display the Backstage view.
- **Home** — Use this tab to access the most commonly used buttons from other tabs on the ribbon.
- **Toolpath** — Use this tab to create Toolpaths and modify their settings.
- **Toolpath Edit** — Use this tab to edit existing Toolpaths.
- **Tool** — Use this tab to create Tools and modify their settings.
- **Boundary** — Use this tab to create and edit Boundaries that are used to limit areas that you want to machine.

- **Pattern** — Use this tab to create and edit Patterns.
- **Hole Feature Set** — Use this tab to detect, create, and manage holes in a model.
- **Feature Group** — Use this tab to detect, create, and manage features in a model
- **Workplane** — Use this tab to create and edit Workplanes.
- **Model** — Use this tab to create Models and manage the Levels or Sets they belong to.
- **Stock Model** — Use this tab to create and edit Stock Models.
- **Machine Tool** — Use this tab to import and orient Machine Tools.
- **Simulation** — Use this tab to simulate Toolpaths and NC Programs to identify any issues before machining.
- **NC Program** — Use this tab to create and postprocess NC Programs.
- **View** — Use this tab to control the display of information in the Graphics window.

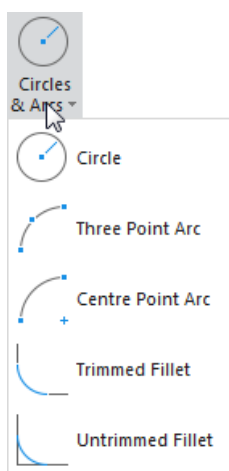
Menu buttons

Menu buttons contain multiple buttons.

- Click the top part of a menu button to use the displayed button.



- Click the bottom part of a menu button and select a button in the list to change which button is displayed.



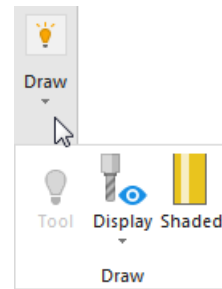
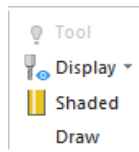
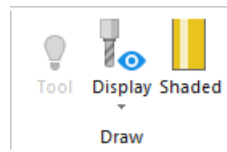
Button size

Buttons resize depending on the width of the PowerMill window.

Large window

Small window

Very small window



View toolbar

A View toolbar is displayed vertically, to the right of the Graphics window. Use it to quickly access the most commonly used View buttons.

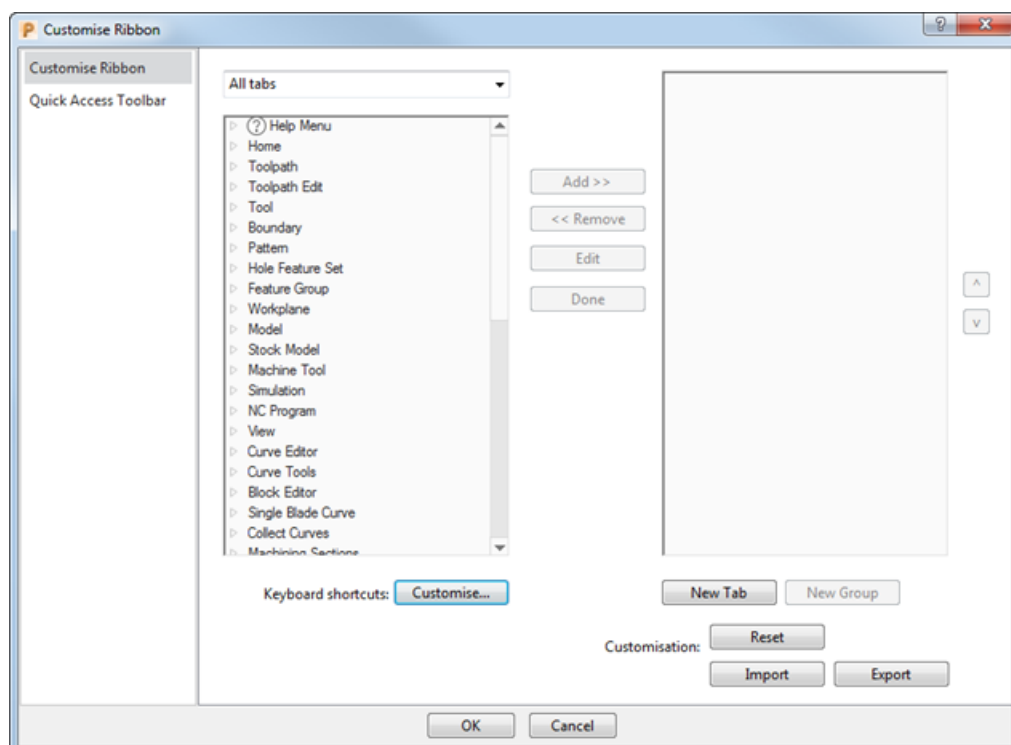
Help menu

The Help menu is still available, to access it, click the **Help** ? icon at the top-right of the PowerMill window.

Customising the ribbon

You can customise the ribbon to include your own tabs and groups that contain commands from existing tabs. This enables you to group commonly used commands onto a single tab.

To display the **Customise Ribbon** dialog, click File tab > Options > Customise the Ribbon and Quick Access Toolbar



To create a custom tab and add a command:

- 1 Click **New Tab**.
- 2 Click **Edit**:
 - a Enter a **Name** for the tab.
 - b Enter a **Description** for the tab.
 - c Click **Done**.
- 3 Click **New Group**:
 - a Enter a **Name** for the group.
 - b Enter a **Description** for the group.
 - c Click **Done**.
- 4 From the list on the left of the dialog navigate through the categories and select the command you want to add to the group.
- 5 Click **Add**.
- 6 Click **OK** to close the dialog.

The dialog contains additional options:

- **Customise** — Click to display the **Customise Keyboard Shortcuts** dialog.
- **Reset** — Click to remove any ribbon customisation.
- **Import** — Click to load a customised ribbon from a file.
- **Export** — Click to save your customised ribbon to a file.

Quick Access Toolbar

The Quick Access Toolbar displayed above the ribbon enables you to quickly access frequently used ribbon commands, without having to navigate the ribbon.



Click the down arrow  button at the end to display the **Customise Quick Access Toolbar** menu. It contains the following:

- The list of commands on the toolbar



Click an item to toggle its display on the toolbar.

- **More commands** — Select this option to customise the buttons that appear on the Quick Access Toolbar.
- **Show Quick Access Toolbar Below the Ribbon** — Select this option to place the Quick Access toolbar below the ribbon, or deselect it to place it above the ribbon.

Customising the Quick Access Toolbar

Use the **Quick Access Toolbar** page of the **Customise Ribbon** dialog to add, remove, and order the buttons on the Quick Access Toolbar.

To display the Customise Ribbon dialog, click the down arrow button at the end of the Quick Access Toolbar and select **More commands**.

To add a button to the Quick Access Toolbar:

- 1 Select a category from the list on the left of the dialog.
- 2 Select the button you want to add.
- 3 Click **Add**.

The dialog has other options:

- **Reset** — Click to revert the Quick Access Toolbar to its default setup.
- **Import** — Click to load a customised Quick Access Toolbar from a file.
- **Export** — Click to save a customised Quick Access Toolbar to a file.

Expanding tooltips

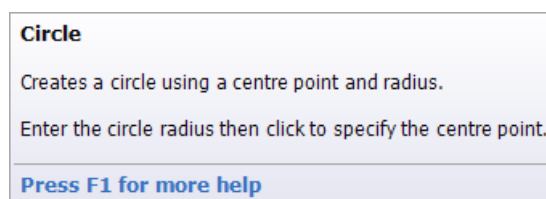
Tooltips provide information about an item in the user interface.

To display an expanding tooltip:

- 1 Hover the cursor over an item to display its tooltip.



- 2 Continue to hover the cursor over an item to display an expanding tooltip which contains additional information about that item.



You can specify how tooltips are displayed from the **Tooltips > Tooltip Options** category of the **Options** dialog.

Colour scheme

PowerMill 2018 has a new default colour scheme, which gives consistency across related Autodesk products. The default background colour is light grey. Some display elements have new colours to ensure visibility against the new background. The elements that have new colours include:

To view and edit default colours:

- 1 Open a project in PowerMill.
- 2 Click File tab > Options > Customise Colours.
- 3 In the **Customise Colours** dialog tree, use the sub-pages to edit the colours for those entities.

To change the colour of the CAD View background:

- 1 Open a project in PowerMill.
- 2 Click File tab > Options > Customise Colours.
- 3 In the **Customise Colours** dialog tree, select View Background > Top.
- 4 Click **Edit**.
- 5 In the **Customise Colour** dialog, select a colour from **Basic colors** or **Custom colors**.
- 6 To use a new custom colour:
 - a Pick a colour from the colour chart or enter its values.
 - b Click **Add to Custom Colours**.
- 7 Click **OK**.
- 8 Repeat steps 3 to 7 for View Background > Bottom.



If you set different colours for the background top and bottom, a gradient effect is applied.

- 9 Click **Close** to close the **Customise Colours** dialog.

Turning

There are improvements to turning functionality in PowerMill 2018:

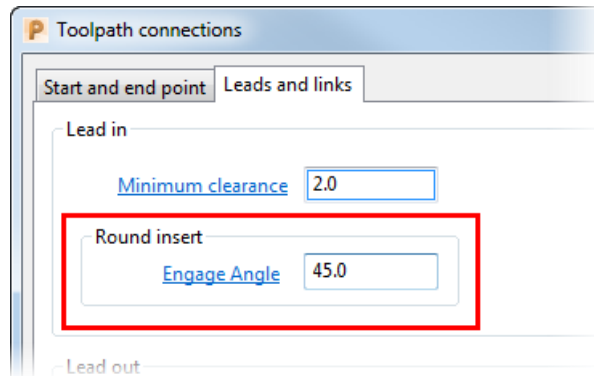
- Toolpath connections (see page 11) — There are enhancements to toolpath connections for turning strategies.
- Toolpath editing (see page 12) — Toolpath editing is enabled for turning toolpaths.
- Stock model — You can apply the turning block and turning toolpaths to a stock model.

Toolpath connections

There are enhancements to toolpath connections for turning strategies.

- You can now use the **Toolpath connections** dialog to specify the approach and retract moves for the start, end, and connecting segments of a turning toolpath. The following tabs are only available for turning strategies:
 - **Start and end point** — Use this tab to specify the location and reference point of the toolpath's start and end points.
 - **Leads and links** — Use this tab to specify the tool movement before, after and between cuttings moves.
- You can now apply linear extensions to the lead in and lead out moves for finishing toolpaths.
- You can now specify a link clearance for finishing toolpaths.

- The option to specify the **Engage Angle** for roughing toolpaths with a **Style** of **Round Insert** is now located in the **Leads and links** tab of the **Toolpath connections** dialog.



*The options on each tab of the **Toolpath connections** dialog are also available on the pages of the same name in the **Strategy** dialog.*

Toolpath editing

Toolpath editing is now enabled for turning toolpaths. Editing a turning toolpath is the same as editing a milling toolpath, however some editing operations are unavailable.

Use the following options on the **Toolpath Edit** tab to edit a turning toolpath:

- **Toolpath Connections** — Displays the **Toolpath connections** dialog which enables you to specify the approach and retract moves for the start, end, and connecting segments of the active toolpath.
- **Reorder** — Display the **Reorder Toolpath Segments** dialog which enables you to delete or change the order and direction of toolpath segments.
- **Limit** — Displays the **Toolpath Limit** dialog which enables you to create a new toolpath by limiting the active toolpath.
- **Edits** — Displays the **Toolpath Editing History** dialog which shows a history of all the toolpath edits.

Generating toolpaths

There are improvements to generating toolpaths in PowerMill 2018:

- Dynamic machine control within a region (see page 13)
- Modifying the feedrate for specific toolpath regions (see page 14)
- Blisk tool-axis controls (see page 15)
- 3D Offset Centreline (see page 16)
- Feature machining strategies (see page 18)
- Stock-collision detection for feature machining (see page 18)

Dynamic machine control within a region

You can now use dynamic machine control within specific regions of a toolpath. This enables you to modify the tool axis and configuration of a 3+2 axis machine tool in precise locations along a toolpath.

To select a region for editing:

- 1 Click Toolpath Edit tab > Edit panel > Dynamic Machine Control to display the **Dynamic Machine Control** tab.
- 2 Click Dynamic Machine Control tab > Edit panel > Select Regions to display the **Select Edit Region** dialog.
- 3 Select an option the **Define Region By** list to specify how the region is selected. The options to select a region are the same as those for toolpath editing with the following exception:
 - **Current point** — Applies the tool-axis edit to the selected point on a toolpath.
 - **Edit Distance** — Specifies a distance either side of the selected point to apply the tool-axis edit.

- 4 Click **Save**.

To edit the tool axis and update the toolpath in a selected region:

- 1 Use the **Control** tab or the tool graphic handles to edit the tool axis in the selected region.
- 2 Click Control tab > Edit panel > Update Selected Regions. The toolpath is updated.

Blending a change in tool axis over a region

You can now blend the orientation of tool axes in a specified region. This enables the tool to smoothly transition from one tool axes to another.

To blend tool-axes:

- 1 Click Toolpath Edit tab > Edit panel > Dynamic Machine Control to display the **Dynamic Machine Control** tab.
- 2 Click Dynamic Machine Control tab > Edit panel > Select regions to display the **Select Edit Region** dialog.
- 3 Select a **Define Region By** of **Polygon**.
- 4 Draw a box over a toolpath region that contains at least two tool-axis orientations.
- 5 Click **Save**.
- 6 Click Dynamic Machine Control tab > Edit panel > Interpolate Tool Axis in Regions.

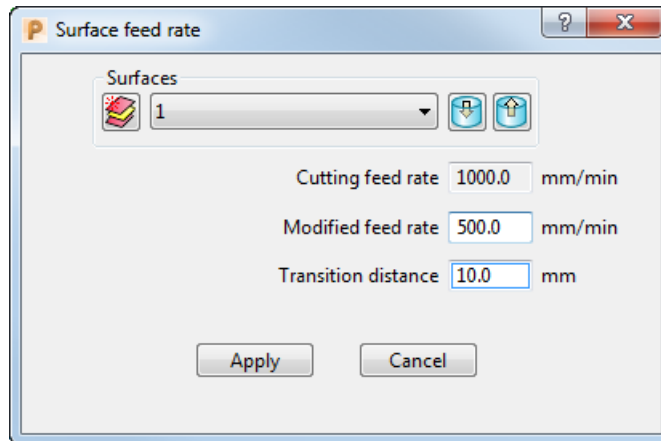
Modifying feedrate in specified toolpath regions

You can now modify the feedrate of a machine tool in specific regions of milling toolpaths. Reducing the feedrate on sharp corners, such as blade edges, can improve the quality of the surface finish.

You can only modify the regions of a toolpath which contact a surface in a Level or Set.

To modify the feedrate of a toolpath region:

- 1 Right-click on an individual toolpath and select **Edit > Update Feedrate On Chosen Surfaces** to display the **Surface feed rate** dialog.



- 2 Use the options in the **Surfaces** area to specify the surfaces where the feedrate is modified. Any toolpath contacting these surfaces is machined at the modified rate.
 -  — Click to create a new Set.
 -  — Select a Level or Set from the list that contains the surfaces where you want to modify the feed rate.
 -  — Click to place the selected surface components into the selected Level or Set.
 -  — Click to remove the selected surface components from the selected Level or Set.
- 3 Enter an absolute value for the **Modified feed rate**.
- 4 Enter a **Transition distance** over which the modified feedrate is blended back to the **Cutting feed rate**.
- 5 Click **Apply**.

Blink tool-axis controls

Blink tool axis controls are now available for a wide range of strategies. This enables you to apply the tool-axis orientation and collision avoidance settings, used to machine blisks and impellers, to your preferred machining strategy.

To apply blink settings for tool-axis orientation:

- 1 Open the Strategy dialog and navigate to the **Tool axis** page.
- 2 Select **Blink** from the **Tool axis** list.
- 3 Specify the **Tool axis elevation** settings.

- 4 If you select a Hub or Shroud reference in the **From** list, select the level or set containing the reference surface in the **Hub** or **Shroud** list.

To apply blisk settings for collision avoidance:

- 1 Open the Strategy dialog and navigate to the **Collision Avoidance** page.
- 2 Select **Specified direction** from the **Tilt method** list. This displays the **Specified direction** area.
- 3 Select **Blisk** from the **Tilt direction** list.
- 4 Select an option from the **Path position** list to specify the toolpath position:
 - **Around blade** — Collision avoidance is calculated considering the tool is machining around a single blade.
 - **Between blades** — Collision avoidance is calculated considering the tool is machining between two blades.
- 5 Use the remaining options to select the levels or sets that contain the blisk surfaces used for collision avoidance.



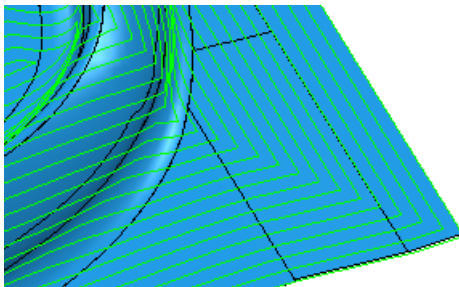
*These options are also available on the **Tool Axis** dialog.*

3D Offset Centreline

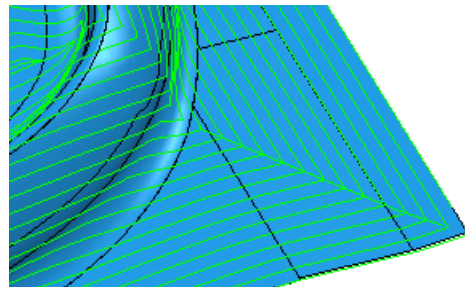
When a 3D offset toolpath makes a corner, the distance between the consecutive passes becomes slightly larger than the specified stepover. This results in small cusps that exceed tolerance at the junction.

Use the new **Centreline** option for strategies that use 3D offset functionality, to remove these cusps by machining a line through the centre of these junctions.

Centreline off.



Centreline on.



The **Centreline** option appears on main page of the following strategies:

- 3D offset finishing.
- Optimised constant Z finishing.

- Steep and shallow finishing.

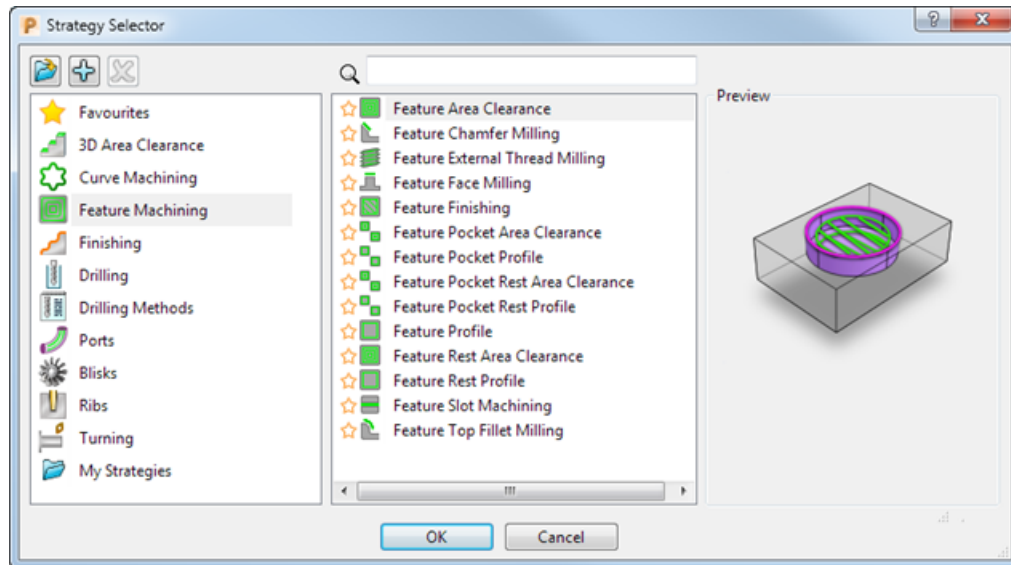
Feature machining strategies

There are new feature machining strategies in PowerMill 2018:

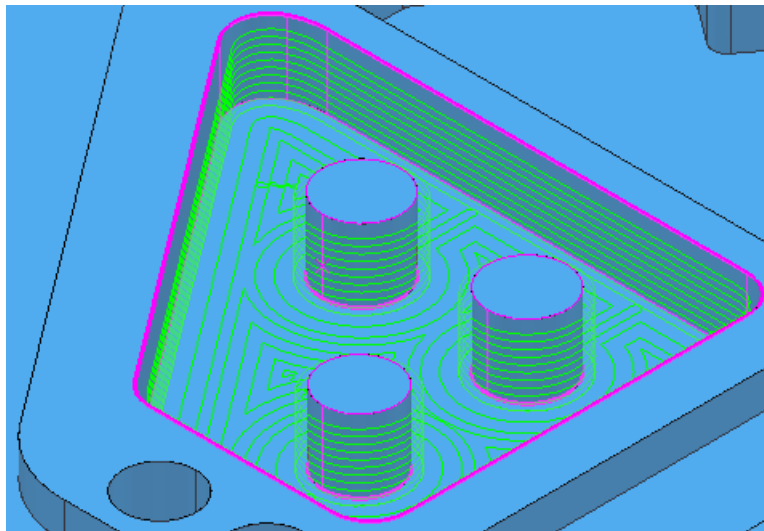
- Feature finishing (see page 1) — performs finishing or semi-finishing passes on the walls and flats of pocket and boss features.
- Feature top fillet milling (see page 12) — machines fillets along the outside edges of features.

Feature finishing

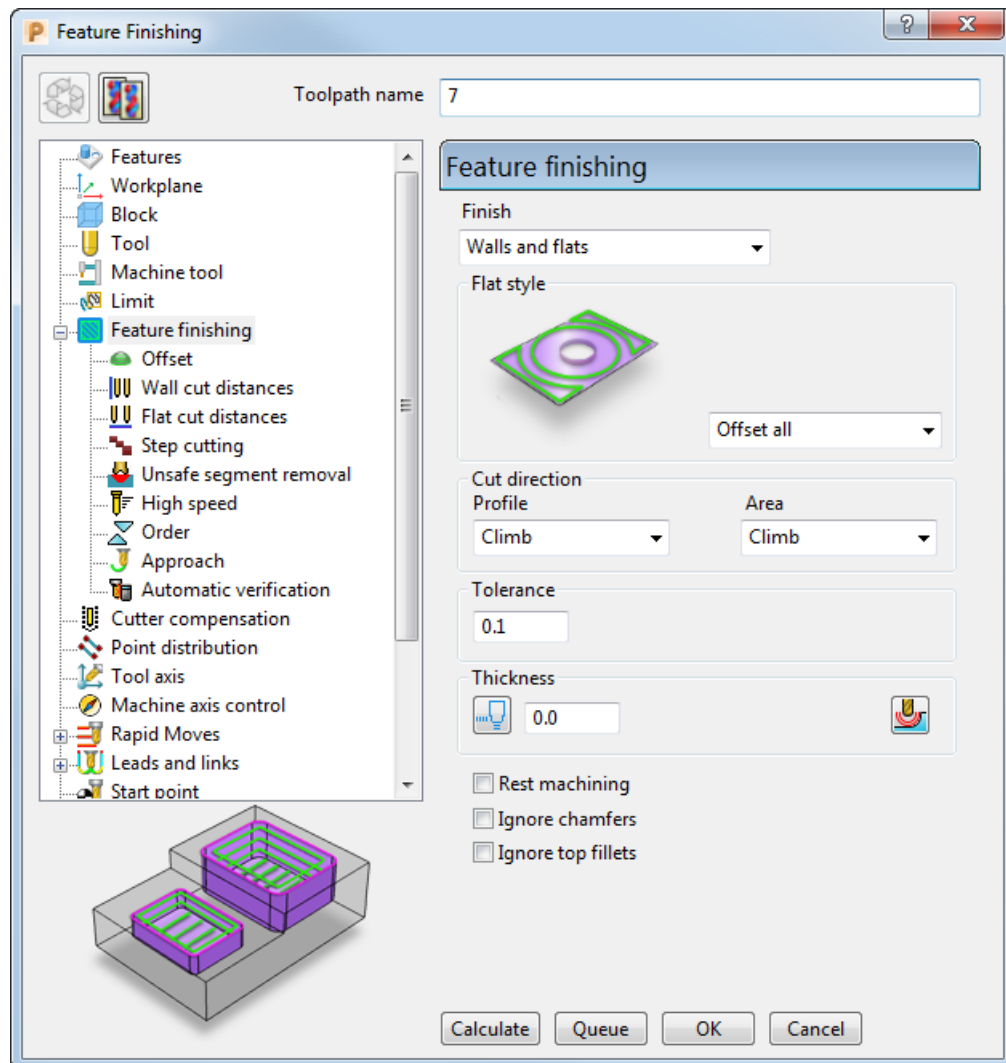
There is a new **Feature Finishing** strategy in the **Feature Machining** category of the **Strategy Selector** dialog.



Use the **Feature Finishing** strategy to perform finishing or semi-finishing passes on the walls and flats of pocket and boss features.



There are several pages associated with the **Feature Finishing** strategy:

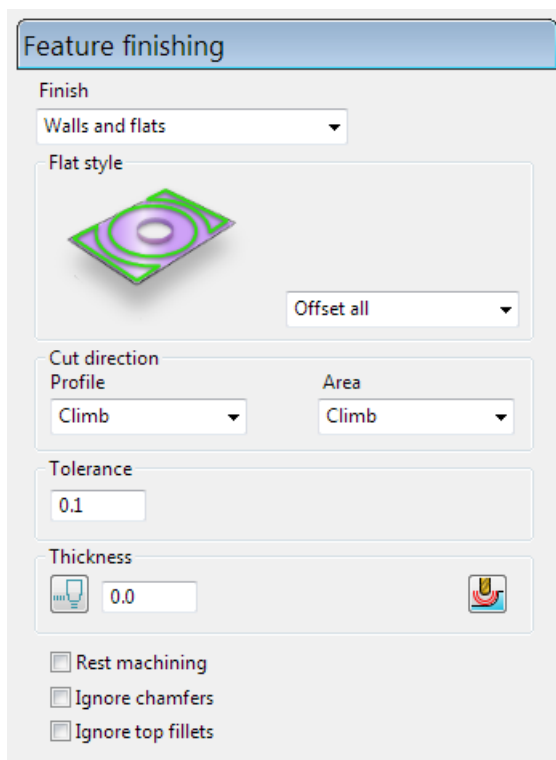


- **Feature finishing** (see page 3) — The main page used to specify a feature finishing toolpath.
- **Raster** — Settings to define a raster finishing style. This page is available when you select a **Style** of **Raster** on the main page.
- **Offset** — Settings to define offset finishing styles. This page is available when you select a **Style** of **Offset model** or **Offset all** on the main page.
- **Wall cut distances** (see page 6) — Settings to control multiple passes around the walls of features.
- **Flat cut distances** (see page 7) — Settings to control multiple passes over the flat surfaces of features.
- **Step cutting** — Settings to define in-line rest finishing. This minimises terracing when creating finishing toolpaths with a large stepdown. This is available when you select a **Stepdown** of **Automatic**.

- **Unsafe segment removal** — Settings to remove small toolpath segments.
- **High speed** — Settings to control smoothing options to avoid sharp changes in tool direction when high speed machining. This page is only available for offset styles.
- **Order** (see page 9) — Settings to control the order of machining.
- **Approach** — Settings to control how the tool approaches the path.
- **Automatic verification** — Settings to automatically verify toolpaths on creation.

Feature finishing

Use the **Feature finishing** page to create a finishing or semi-finishing toolpath which clears material from the: sides, bottoms of pockets, and tops of bosses. The toolpath slices the feature at specific Z heights and then creates an offset or raster pass at each Z height.



The screenshot shows the 'Feature finishing' dialog box. It has a title bar 'Feature finishing'. Below it, the 'Finish' section has a dropdown menu set to 'Walls and flats'. The 'Flat style' section shows a 3D model of a pocket with concentric green and purple lines representing the toolpath. To the right of the model is a dropdown menu set to 'Offset all'. The 'Cut direction' section has two dropdown menus: 'Profile' set to 'Climb' and 'Area' set to 'Climb'. The 'Tolerance' section has a text input field with the value '0.1'. The 'Thickness' section has a text input field with the value '0.0' and two icons: a blue square with a white 'X' and a red square with a white 'X'. At the bottom, there are three checkboxes: 'Rest machining', 'Ignore chamfers', and 'Ignore top fillets', all of which are currently unchecked.

Finish — Select which regions of the feature group to finish.

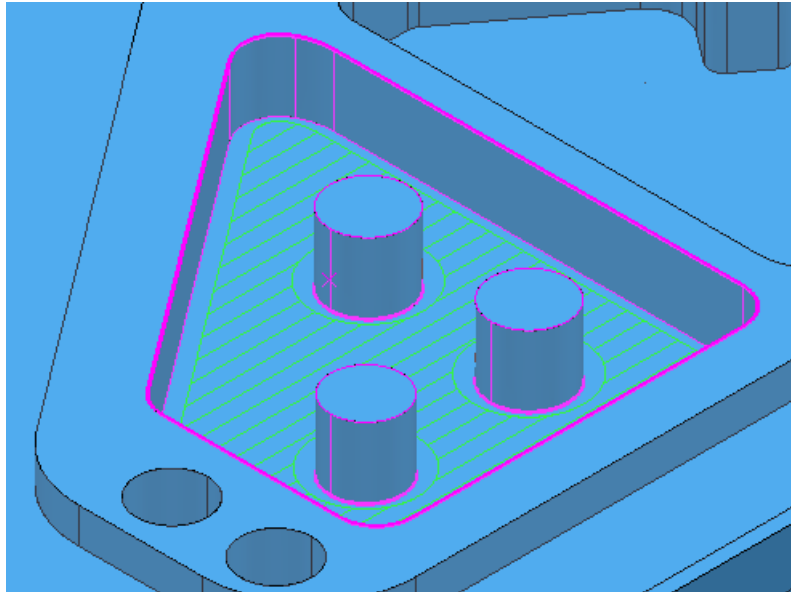
Select a region from the following:

- **Walls and flats** — Finishes the: sides of features, tops of bosses, and bottoms of pockets.
- **Walls** — Finishes only the sides of features.
- **Flats** — Finishes only the tops of bosses and the bottoms of pockets.

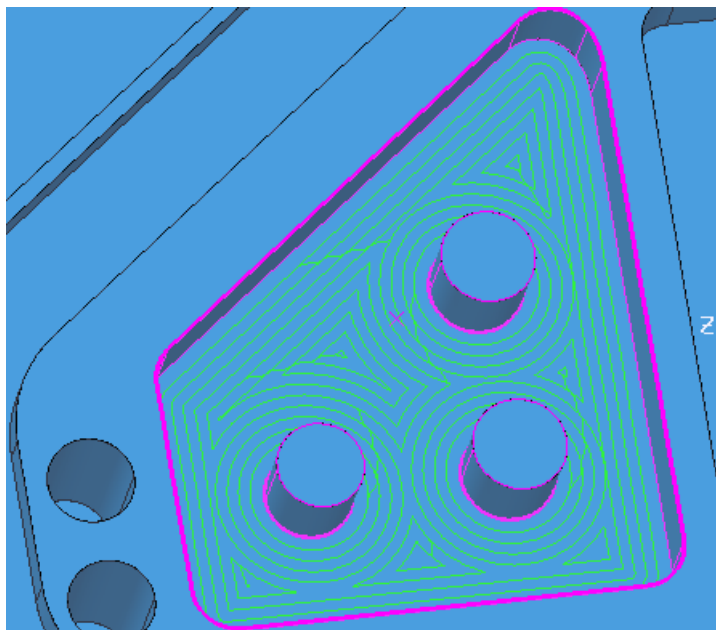
Flat style — Select the raster or offset style to use for removing material.

Select a Style from the following:

- **Raster** — This comprises of parallel straight-line moves in the X - Y plane.



- **Offset model** — This clears an area with contours generated by repeatedly offsetting the initial slice until no further offset is possible.



This produces a toolpath which:

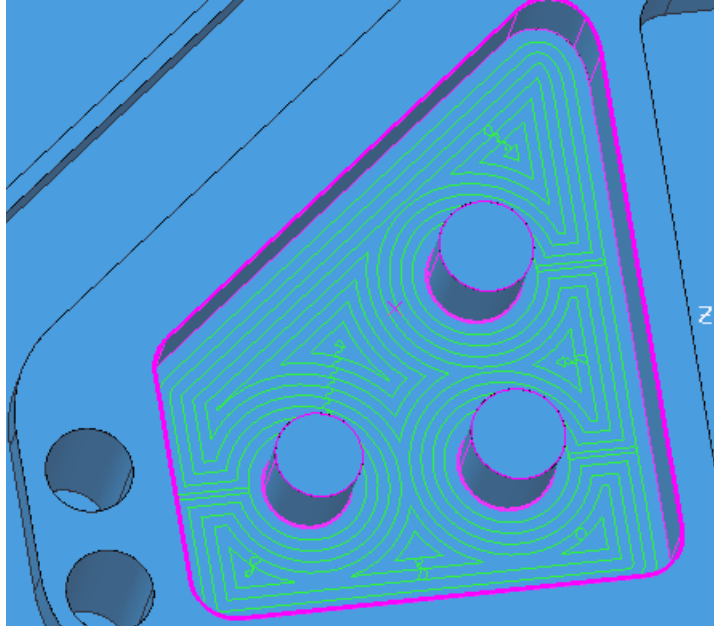
- Maintains constant tool load and chip production
- Maintains cut direction
- Avoids machining small or thin-walled upstands

- Minimises full width cuts.



This option increases the number of tool lifts.

- **Offset all** — This produces an offset toolpath which minimises the number of tool lifts and works extremely well for soft materials.



Cut direction — Select a milling style for **Profile** and **Area**.

Tolerance — Enter a value to determine how closely the toolpath follows the feature.

Thickness — Enter the amount of material to be left on the part.

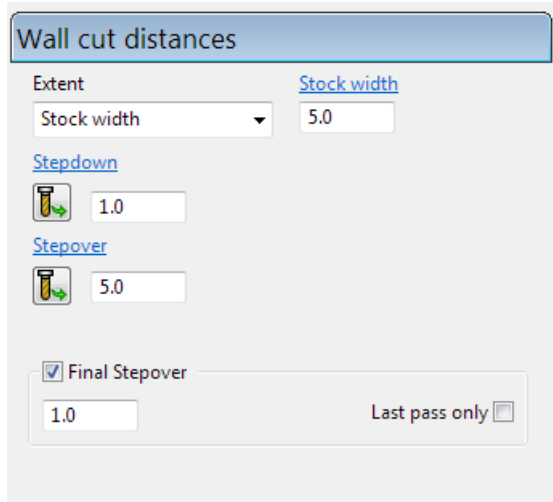
Rest machining — Select to change the strategy to **Feature Rest Finishing** and make the **Rest** page available with the options for rest machining. This option is not selected by default for this strategy.

Ignore chamfers — When selected the chamfers are not machined.

Ignore top fillets — When selected the top fillets are not machined.

Wall cut distances

Use the **Wall cut distances** page to control how much excess material is removed around a feature. This is carried out by a series of horizontal passes.



*This page is only available if you select a **Finish of Walls** or **Walls and Flats** on the **Feature finishing** page.*

Extent — Select how to calculate the limits of multiple passes.

Number of cuts — Enter a number to limit the number of passes.

Stock width — Enter a distance to specify the width of stock remaining around the feature walls. This limits the maximum starting distance for multiple passes.

Stepdown — Enter the distance between different machining levels.



Copy stepdown from tool — Click to load the axial depth of cut from the active tool's cutting data. The axial depth of cut is measured along the tool axis.



If you enter the value manually, the button changes to .

Stepover — Enter the distance between successive finishing passes at a single Z height.

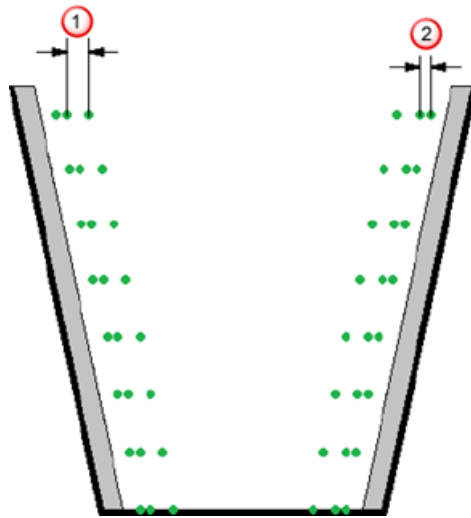


Copy stepover from tool — Click to load the radial depth of cut from the active tool's cutting data. The radial depth of cut is measured normal to the tool axis.



If you enter the value manually, the button changes to .

Final Stepover — Select to specify the offset distance for an additional last pass.



- ① — Stepover distance.
- ② — Final stepover distance.

Last pass only — When selected the **Final Stepover** is only applied to the pass at the final Z height.

Flat cut distances

Use the **Flat cut distances** page to control how much excess material is removed above a features flats. This is carried out by a series of vertical passes.

Flat cut distances

Extent [Stock depth](#)
Stock depth 10.0

[Stepover](#)
5.0

[Stepdown](#)
1.0

☒ Final Stepdown
1.0



*This page is only available if you select a **Finish of Flats** or **Walls and Flats** on the **Feature finishing** page.*

Extent — Select how to calculate the limits of multiple passes.

Number of cuts — Enter a number to limit the number of passes.

Stock depth — Enter a distance to specify the depth of stock remaining above the feature flats. This limits the maximum starting distance for multiple passes.

Stepover — Enter the distance between successive finishing passes at a single Z height.



Copy stepover from tool — Click to load the radial depth of cut from the active tool's cutting data. The radial depth of cut is measured normal to the tool axis.



If you enter the value manually, the button changes to 

Stepdown — Enter the distance between different machining levels.

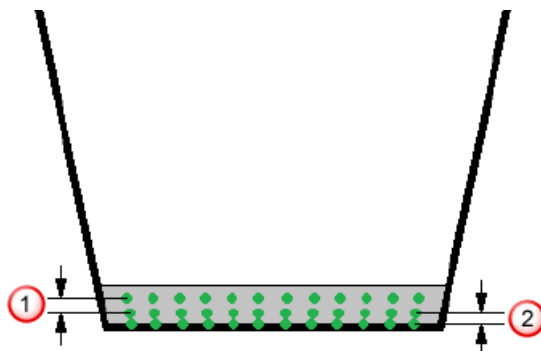


Copy stepdown from tool — Click to load the axial depth of cut from the active tool's cutting data. The axial depth of cut is measured along the tool axis.



If you enter the value manually, the button changes to 

Final Stepdown — Select to specify the offset distance for an additional last pass.

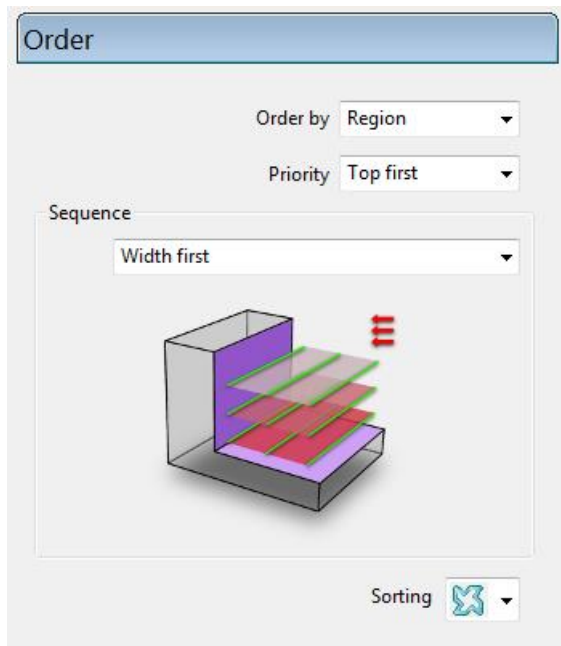


① — Stepdown

② — Final stepdown

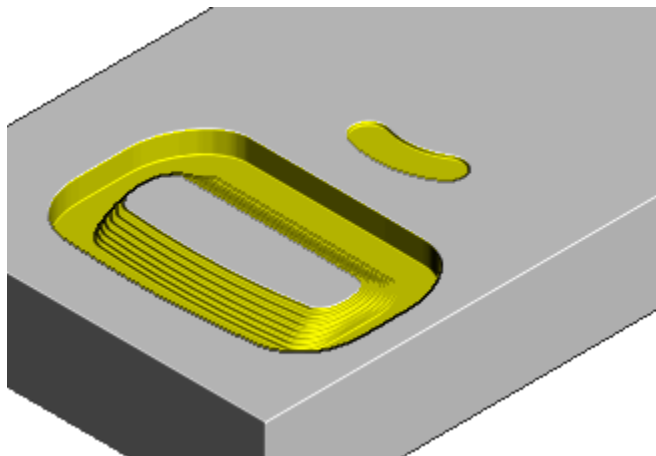
Order (Feature finishing)

Use the **Order** page to control the order of machining.

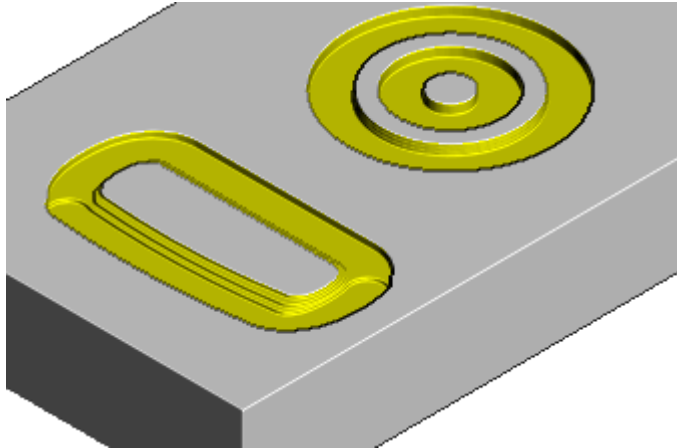


This page contains the following:

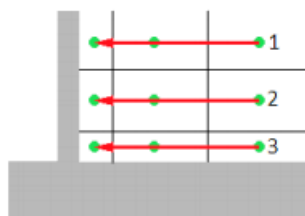
- **Order by** — Select the order of machining:
 - **Region** — When selected, one region (such as a pocket or boss) is completely machined before going on to the next. So, pockets are machined in preference to levels.



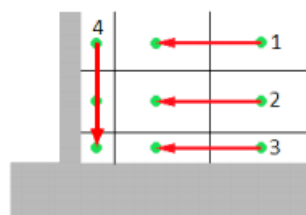
- **Level** — When selected, one level is completely machined before going down to the next. So, levels are machined in preference to pockets.



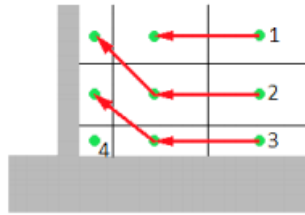
- **Priority** — Select the feature regions that are machined first:
 - **Top first** — Select this option to machine from the top regions downwards. If you have a boss, the flat at the top is machined before its walls. If you have a pocket its walls are machined before the flat at the bottom.
 - **Wall first** — Select this option to machine the walls of a feature before its flats. If you have a boss, its walls are machined before the flat at the top. If you have a pocket its walls are machined before the flat at the bottom.
- **Sequence** — Select an option from the list to specify the whether walls or flats are machined first.
 - **Width first** — Remove material to the width specified on the **Wall cut distances** page before stepping down.



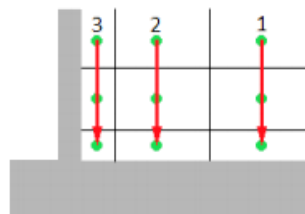
- **Width first with final wall passes** — Remove material to the width specified on the **Wall cut distances** page except the final wall pass before stepping down. Then perform a final pass that removes the remaining material at all Z heights.



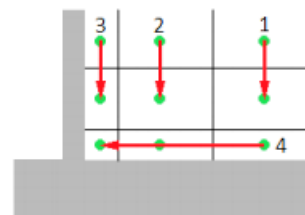
- **Thin walls** — For each Z height, remove material to the width specified on the **Wall cut distances** page except the final wall pass, then machine the remaining material from the previous Z height.



- **Depth first** — Remove material to the depth specified on the **Flat cut distances** page before stepping over.



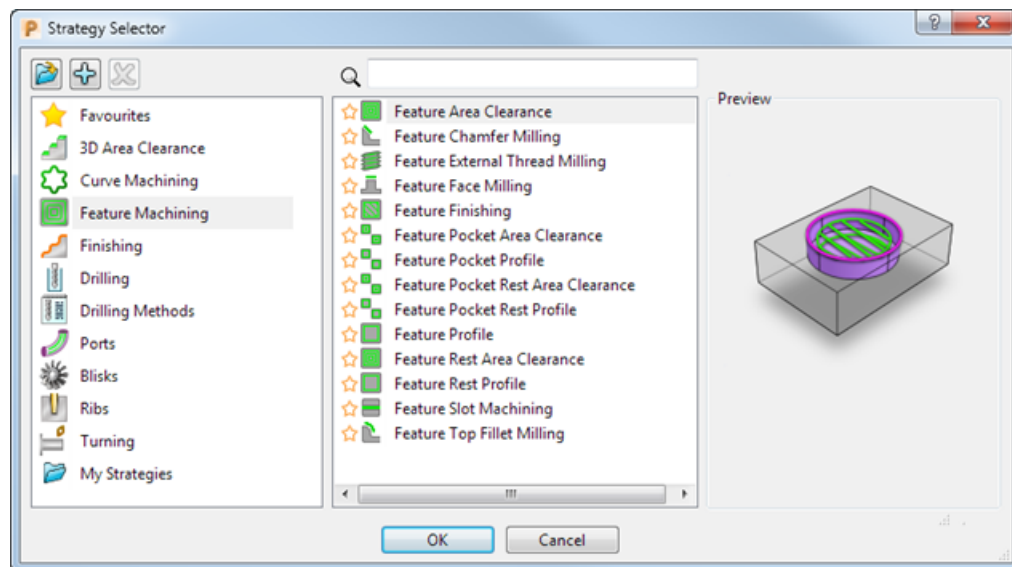
- **Depth first with final floor passes** — Remove material to the depth specified on the **Flat cut distances** page except the final floor pass before stepping over. Then perform a final pass that removes the remaining material for the final Z height.



- **Sorting**  — Select an option to specify the toolpath order.

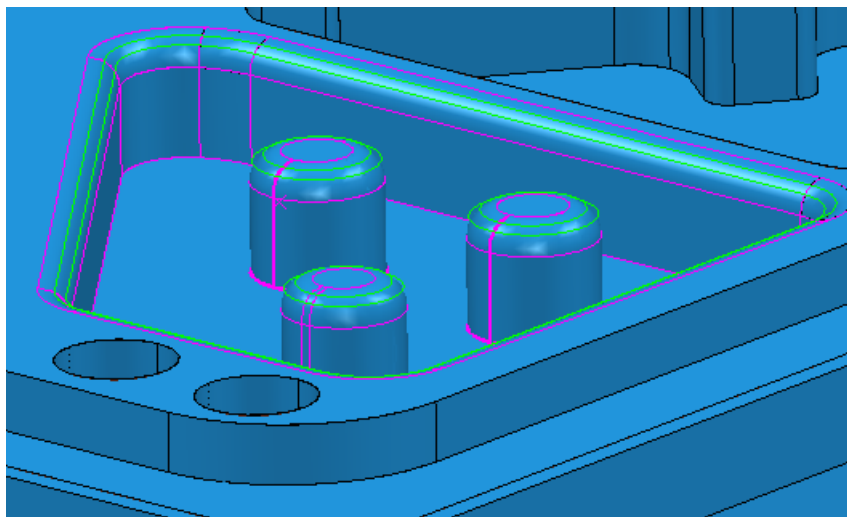
Feature top fillet milling

There is a new **Feature Top Fillet Milling** strategy in the **Feature Machining** category of the **Strategy Selector** dialog.

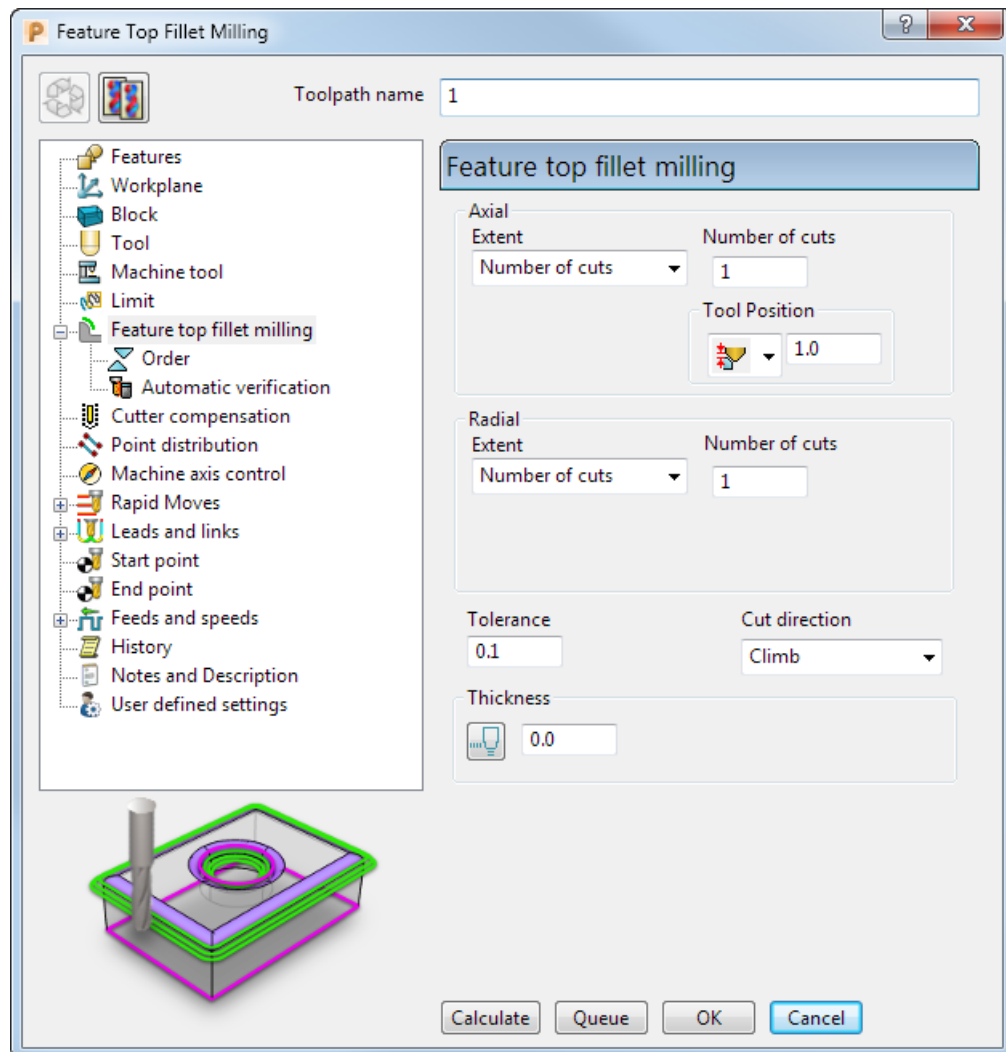


Use the **Feature Top Fillet Milling** strategy to machine fillets along the outside edges of features, where the fillet information is specified by the feature geometry. Feature top fillet milling is used to:

- break sharp outside-edges of a model after it has been completely machined
- minimise hand deburring operations
- make aesthetic improvements.



There are several pages associated with the **Feature Top Fillet Milling** strategy:



- **Feature top fillet milling** (see page 13) — The main page to specify the options for the feature top fillet milling strategy.
- **Order** — Settings to control the order of machining.
- **Automatic verification** — Settings to automatically verify toolpaths on creation.

Feature top fillet milling

Use the **Feature top fillet milling** page to specify the cutting range in the axial and radial directions of the tool.

Axial

Multiple cuts are generated along the axial direction.

Extent — Select how to calculate the limits of multiple passes.

- **Number of cuts** — Enter a number to limit the number of passes.

- **Top fillet extent** — Machine the total height of the fillet.
- **Stock extent** — Machine the distance between the tool start position and the end of the block.

Extra depth — Specify an extra distance above and below the fillet for your toolpath range.



*This option is only available for when you select an **Extent of Top fillet extent**.*

Stepdown — Enter the maximum distance between successive passes.

-  **Copy stepdown from tool** — Click to load the axial depth of cut from the active tool's cutting data. The axial depth of cut is measured along the tool axis.
- If you enter the value manually, the button changes to .



*These options are only available when you select an **Extent of Top fillet extent** or **Stock extent**.*

Tool position — Select the position of the tool relative to the fillet.

-  **Top axial depth** — The distance the tool extends above the top of the fillet.
-  **Bottom axial depth** — The distance the tool extends below the bottom of the fillet.
-  **Gauge diameter** — The effective tool diameter at the contact point of the tool on the fillet.



*These options are only available when you select an **Extent of Number of cuts** or **Stock extent**.*

Radial

Multiple cuts are generated along the radial direction.

Extent — Select how to calculate the limits of multiple passes.

- **Number of cuts** — Enter a number to limit the number of passes.
- **Chamfer extent** — Machine the total height of the fillet.
- **Stock extent** — Machine the distance between the tool start position and the end of the block.

Extra width — Specify an extra distance radially around the fillet for your toolpath range.



*This option is only available for when you select an **Extent of Top fillet extent**.*

Stepover — Enter the distance between successive area clearance passes at a single Z height.



- **Copy stepover from tool** — Click to load the radial depth of cut from the active tool's cutting data. The radial depth of cut is measured normal to the tool axis.

- If you enter the value manually, the button changes to .



*These options are only available when you select an **Extent of Top fillet extent** or **Stock extent**.*

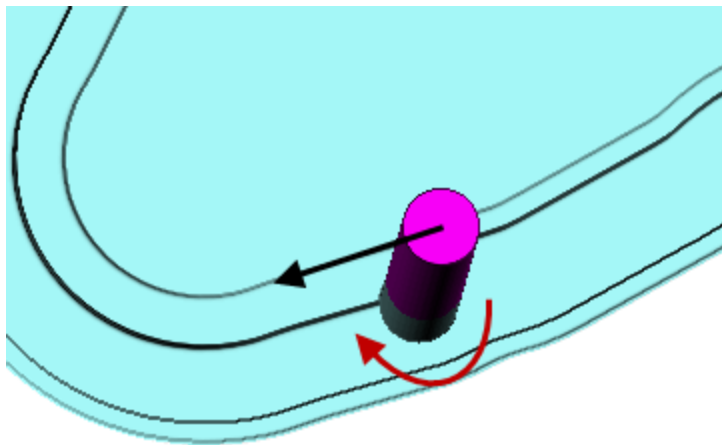
Other options

Tolerance — Enter a tolerance value to determine how accurately the toolpath follows the feature.

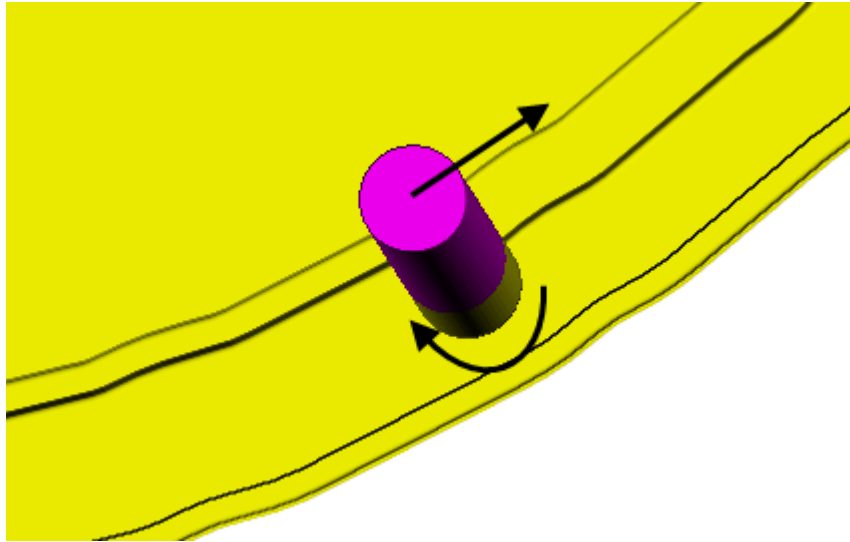
Cut direction — Select the milling technology.

Select a **Cut Direction** from the following:

Climb — Select to create toolpaths using only climb milling, where possible. The tool is on the left of the machined edge when viewed in the direction of tool travel.



Conventional — Select to create toolpaths using only conventional or upcut milling, where possible. The tool is on the right of the machined edge when viewed in the direction of tool travel.

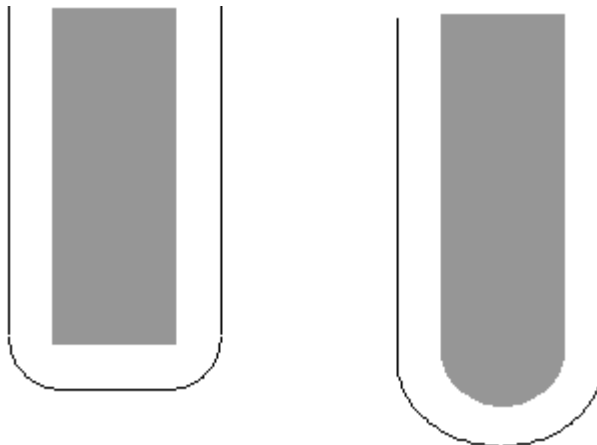


Any — Select to create toolpaths using both conventional and climb milling. This minimises the tool lifts and tool travel.

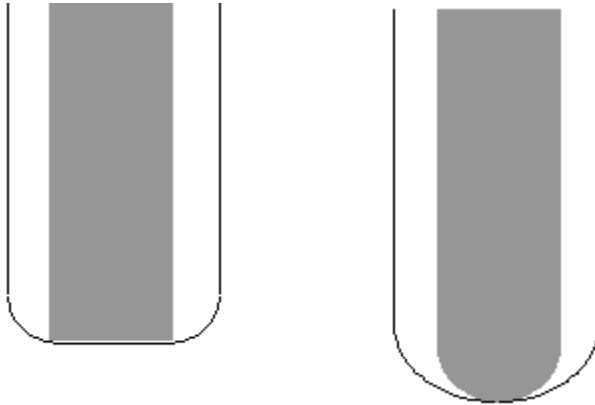
Thickness — Enter the amount of material to be left on the part.

-  — Click the **Thickness**  button to change the **Thickness** box to **Radial thickness**  and the **Axial thickness**  box is displayed. Use this to specify separate **Radial** and **Axial** thickness values   .

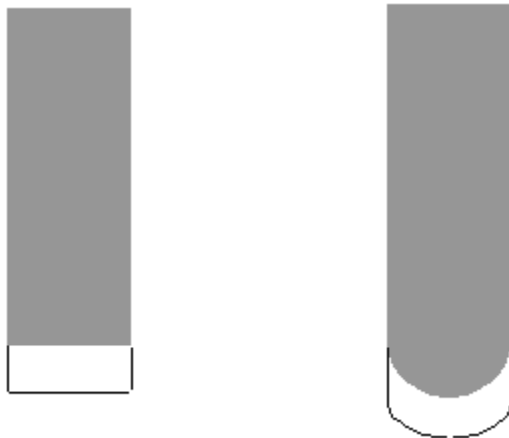
-  **Thickness** — Enter the offset to the tool in all directions.



-  **Radial thickness** — Enter the radial offset to the tool. When 2.5-axis or 3-axis machining, a positive value leaves material on vertical walls.

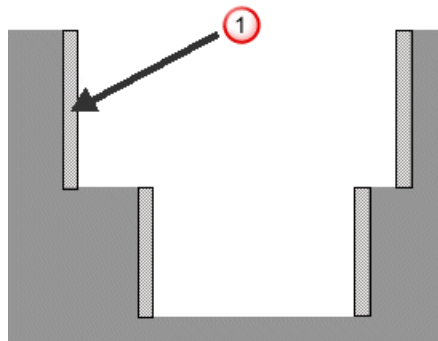


-  **Axial thickness** — Enter the offset to the tool, in the tool axis direction only. When 2.5-axis or 3-axis machining, a positive value leaves material on horizontal faces.



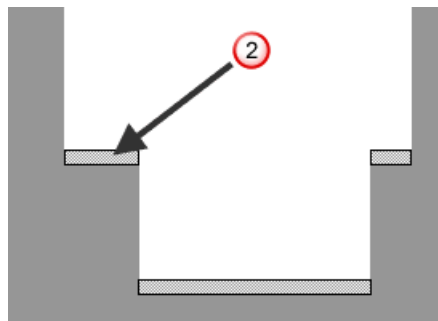
Variable thickness (separate **Radial** and **Axial thickness** values) is useful for orthogonal parts. You can use variable thickness on sloping walled parts, although it is more difficult to predict the results.

- In thin-walled aerospace parts, use the area clearance toolpath to finish the floor of the pocket, but leave material on the thin vertical walls by specifying a positive **Radial thickness** value and an **Axial thickness** of **0**:



① Radial thickness

- Alternatively, to finish steep side walls and leave material on the bottom, specify a **Radial thickness** of **0** and a positive **Axial thickness** value:



② Axial thickness

Typically, variable thickness is used on flat-bottomed parts with pockets.

Stock-collision detection for feature machining

You can now automatically check for collisions against the stock when generating a toolpath for the following feature machining strategies:

- Feature Area Clearance
- Feature Rest Area Clearance
- Feature Pocket Area Clearance
- Feature Pocket Rest Area Clearance

To enable stock collision checking, select the new **Check against stock** option on the **Automatic verification** page of the **Strategy** dialog.

The screenshot shows the 'Automatic verification' dialog box. At the top, there is a 'Model gouge check' checkbox. Below it, the 'Thickness' section has a value of 1.0. The 'Head clearance' is set to 600.0. Under the 'Automatic collision checking' section, which is checked, there are three options: 'Check against features' (unchecked), 'Check against model' (unchecked), and 'Check against stock' (checked and highlighted with a red rectangle). At the bottom, 'Holder clearance' and 'Shank clearance' are both set to 0.0.

The initial stock used for collision checking depends on the strategy you have selected. This is because pocket machining strategies without a reference toolpath have no history of what has been machined in the feature hierarchy.

Strategy	Initial stock
Feature area clearance	The block is used as the initial stock.
Feature rest area clearance	A stock model, or the block and a reference toolpath, is used as the initial stock.
Feature pocket area clearance	The initial stock is the space shared by the pockets and the block. It is assumed that there are no collisions outside of the selected pockets.
Feature pocket rest area clearance	Stock model available — The stock model is used as the initial stock. Stock model unavailable — The initial stock is the space shared by the pockets and the block after a reference toolpath has been subtracted from it. It is assumed that there are no collisions outside of the selected pockets.



For feature pocket machining strategies where a stock model is unavailable, you must guarantee that the remaining stock is the same as the pocket geometry.

Simulating toolpaths

There are improvements to simulation in PowerMill 2018:

- Dynamic stock-collision detection (see page 21)

Dynamic stock-collision detection

Collision detection between a tool holder and the stock is added to ViewMill and ViewTurn simulations. This enables you to identify and address any tool holder collisions with a dynamically changing stock, during the simulation process.

To enable dynamic stock collision checking:

- 1 Click Simulation tab > Issues panel > Display Issues. To display the **Simulation Issues** dialog.
- 2 Select **Check the tool and stock**.

If a stock collision is detected during a ViewMill or ViewTurn simulation, a warning is displayed and an issue is added to the Simulation Issues dialog.

Additional changes

There are several smaller changes in PowerMill 2018:

- To enable us to improve your user experience, PowerMill now includes a Desktop Analytics program. To find out more about Desktop Analytics, click Help ⓘ > Desktop Analytics. The **Data Collection and Use** dialog is displayed.
- There is a new **Order** page for the **Steep and Shallow Finishing** strategy. Use the new **Order by** list to select whether the machining order takes place by region or level.
 - **Region** — When selected, one region (such as a pocket or boss) is completely machined before going on to the next. So, pockets are machined in preference to levels.
 - **Level** — When selected, one level is completely machined before going down to the next. So, levels are machined in preference to pockets.
- There is a new **Average axis alignment** option on the Swarf finishing page of the Strategy dialog. Select an option to specify the average orientation of the tool axis with respect to the z-axis.
 - **Along z-axis** — Align the average tool axis orientation to be positive in the active workplane's z-axis direction.
 - **From z-axis** — Align the average tool axis to be perpendicular towards to active workplane's z-axis.



This is useful if you are machining a surface which is largely perpendicular to the z-axis, such as a helix.

- You can now specify the default Coolant for new NC Programs on the Toolpath page of the **NC Preferences** dialog.
- You can now specify the default lead feed-rates using the new **Lead feed rates** tab of the **Feeds and Speeds** dialog. These options are identical to those on individual strategy dialogs.

- You can now detect and select all features on a model by clicking **Detect all** on the **Interactive Feature Detection** dialog.
- You can now show or hide connection moves between items in an NC Program. From an individual NC Program menu, click:
 - **Show Connections** — To show connections between NC Items.
 - **Hide Connections** — To hide connections between NC Items.
- There is a shortcut to create composite curves on the **Create Features** dialog for 2D features.



- There is a shortcut to create a spun profile on the **Create Features** dialog for turning features.



Where's my command?

Use this table to locate commands in the ribbon interface:

Old Location	New Location
Draw > Model	View tab > Appearance panel
Draw > Block	View tab > Appearance panel > Block

Draw > Drilling Holes	View tab > Visibility panel > Drilling Holes
Draw > Active Axes	View tab > Visibility panel > Active Axes
Draw > Transform	View tab > Visibility panel > Transform
Draw > Cursor > Cross Hair	View tab > Cursor panel > Cross Hair
Draw > Cursor > Options	View tab > Cursor panel > Tool > Centre
Draw > Cursor > Options	View tab > Cursor panel > Tool > Tip
Draw > Wireframe	View tab > Appearance panel > Wireframe
Draw > Shaded	View tab > Appearance panel > Shade
Draw > Draw All	View tab > Entities panel > Draw All
Draw > Undraw All	View tab > Entities panel > Undraw All

File > Open Project	File tab > Open > Open
File > Open Project Read-Only	File tab > Open > Open Read-Only
File > Close Project	File tab > Close
File > Save Project	File tab > Save
File > Save Project As	File tab > Save As > Project
File > Save Template Objects	File tab > Save As > Template Objects
File > Project Settings	File tab > Info
File > Open Archived Project	File tab > Open > Archived Project
File > Archive Project	File tab > Save As > Archived Project
File > Import Model	File tab > Import > Import Model
File > Export Model	File tab > Export > Export

	Model
File > Extract Electrode	File tab > Import > Import Electrode
File > Examples	File tab > Import > Examples
File > Print Preview	File tab > Print
File > Print	File tab > Print
File > Delete All	File tab > Close
File > Exit	File tab > Exit

Help > Contents	Help > Contents
Help > What's New	Help > What's New
Help > Getting Started	Help > Getting Started
Help > Autodesk Account	Help > Autodesk Account
Help > Autodesk Knowledge Network	Help > Autodesk Knowledge Network
Help > Autodesk on the Web > PowerMill home page	Help > Autodesk on the Web > PowerMill home page
Help > Autodesk on the Web > Autodesk home page	Help > Autodesk on the Web > Autodesk home page
Help > Documentation > Parameters	Help > Documentation > Parameters > Reference
Help > Documentation > Parameters	Help > Documentation > Parameters > Summary
Help > Documentation > Parameters	Help > Documentation > Parameters > Setup Sheet Summary
Help > Documentation > What's New	Help > Documentation > What's New
Help > Documentation > Getting Started	Help > Documentation > Getting Started
Help > Documentation > Macro Programming Guide	Help > Documentation > Macro Programming Guide
Help > Documentation > MTD User Guide	Help > Documentation > MTD User Guide
Help > About	Help > About

Insert > Project	File tab > Import > Project
Insert > Archived Project	File tab > Import > Archived Project
Insert > Toolpath	File tab > Import > Toolpath
Insert > Template Objects	File tab > Import > Template Objects
Insert > Session	File tab > Import > Session

Tools > Echo Commands	Home tab > Macro panel > Echo Commands
Tools > Reset Forms	File tab > Options > Reset Forms
Tools > Mirror Project	Home tab > Utilities panel > Mirror Project
Tools > Plugins	File tab > Options > Manage Installed Plugins
Tools > Snapping	File tab > Options > Application Options > Intelligent Cursor > Legacy Snapping.
Tools > Snap Filter > Model	File tab > Options > Application Options > Intelligent Cursor > Legacy Snapping.
Tools > Snap Filter > Boundary	File tab > Options > Application Options > Intelligent Cursor > Legacy Snapping.
Tools > Snap Filter > Pattern	File tab > Options > Application Options > Intelligent Cursor > Legacy Snapping.
Tools > Snap Filter > Feature	File tab > Options > Application Options > Intelligent Cursor > Legacy Snapping.
Tools > Snap Filter > Anywhere	File tab > Options > Application Options > Intelligent Cursor > Legacy Snapping.
Tools > Filter Style	Removed
Tools > Customise Paths	File tab > Options > Customise Paths
Tools > Customise Keyboard	File tab > Options > Customise

Shortcuts	Keyboard Shortcuts
Tools > Customise Colours	File tab > Options > Customise Colours
Tools > Options	File tab > Options > Application Options
Tools > Autodesk A360	Home tab > A360 panel > A360

View > Resize to Fit	View tab > Navigate panel > Resize to Fit
View > Zoom to Box	View tab > Navigate panel > Zoom > Zoom to Box
View > View Mode > Milling	View tab > Mode panel > View Mode > Milling
View > View Mode > Turning	View tab > Mode panel > View Mode > Turning
View > From > Right (X)	View tab > Views panel > From > Right (X)
View > From > Back (Y)	View tab > Views panel > From > Back (Y)
View > From > Top (Z)	View tab > Views panel > From > Top (Z)
View > From > Left (-X)	View tab > Views panel > From > Left (-X)
View > From > Front (-Y)	View tab > Views panel > From > Front (-Y)
View > From > Bottom (-Z)	View tab > Views panel > From > Bottom (-Z)
View > ISO > 1	View tab > Views panel > ISO > ISO 1
View > ISO > 2	View tab > Views panel > ISO > ISO 2
View > ISO > 3	View tab > Views panel > ISO > ISO 3
View > ISO > 4	View tab > Views panel > ISO > ISO 4
View > Tool > Down Axis	View tab > Views panel > Tool > Down Axis
View > Tool > From Side	View tab > Views panel > Tool

	> From Side
View > Rotation Anchor > Selected Items	View tab > Cursor panel > Rotation Anchor > Selected Items
View > Rotation Anchor > Origin	View tab > Cursor panel > Rotation Anchor > Origin
View > Rotation Anchor > Active Tool	View tab > Cursor panel > Rotation Anchor > Active Tool
View > Rotation Anchor > View	View tab > Cursor panel > Rotation Anchor > View
View > Refresh	View tab > Views panel > Refresh
View > Blank Selected	View tab > Visibility panel > Blanking > Blank Selected
View > Blank Except	View tab > Visibility panel > Blanking > Blank Except
View > Blank Toggle	View tab > Visibility panel > Blanking > Blank Toggle
View > Unblank	View tab > Visibility panel > Unblank
View > Delete Selected	Delete key
View > Toolbar > Explorer	View tab > Window panel > User Interface > Explorer
View > Toolbar > Viewing	View tab > Window panel > User Interface > View Toolbar
View > Toolbar > Status	View tab > Window panel > User Interface > Status
View > Toolbar > Slices	Individual Toolpath context menu > Edit > Slices
View > Toolbar > Expression Editor	View tab > Window panel > User Interface > Expression Toolbar
View > Toolbar > Command Window	View tab > Window panel > User Interface > Command Window
View > Toolbar > Vertical Plugin Window	View tab > Window panel > User Interface > Vertical Plugin Window
View > Toolbar > Horizontal	View tab > Window panel panel

Plugin Window	> User Interface > Horizontal Plugin Window
View > Toolbar > Custom	File tab > Options > Customise the Ribbon and Quick Access Toolbar
View > Dialogs > Errors and Warnings	File tab > Options > Application Options > View > Dialogs > Show errors and warnings
View > Dialogs > Command Errors	File tab > Options > Application Options > View > Dialogs > Show command errors
View > Snapshot	View tab > Utilities panel > Screenshot
View > Dynamic Sectioning	View tab > Utilities panel > Dynamic Sectioning

Boundary Toolbar > Create a Boundary > Create a Block Boundary	Boundary tab > Create panel > Block
Boundary Toolbar > Create a Boundary > Create a Rest Boundary	Boundary tab > Create panel > Rest
Boundary Toolbar > Create a Boundary > Create a Selected Surfaces Boundary	Boundary tab > Create panel > Selected Surfaces
Boundary Toolbar > Create a Boundary > Create a Shallow Boundary	Boundary tab > Create panel > Shallow
Boundary Toolbar > Create a Boundary > Create a Silhouette Boundary	Boundary tab > Create panel > Silhouette
Boundary Toolbar > Create a Boundary > Create a Collision Safe Boundary	Boundary tab > Create panel > Collision Safe
Boundary Toolbar > Create a Boundary > Stock Model Rest	Boundary tab > Create panel > Stock Model Rest
Boundary Toolbar > Create a Boundary > Create a Contact Point Boundary	Boundary tab > Create panel > Contact Point
Boundary Toolbar > Create a	Boundary tab > Create panel >

Boundary > Create a Contact Conversion Boundary	Contact Conversion
Boundary Toolbar > Create a Boundary > Create a Boolean Operation Boundary	Boundary tab > Create panel > Boolean Operation
Boundary Toolbar > Create a Boundary > Create a User Defined Boundary	Boundary tab > Create panel > User Defined
Boundary Toolbar > Select active Boundary	Boundary tab > Active panel > Active Boundary
Boundary Toolbar > Save Boundary	Boundary tab > File panel > Export
Boundary Toolbar > Insert Boundary file	Boundary tab > File panel > Import
Boundary Toolbar > Insert Boundary	Individual Boundary context menu > Insert > Boundary.
Boundary Toolbar > Insert Pattern	Boundary tab > Edit panel > Insert > Insert Pattern
Boundary Toolbar > Insert Toolpath	Boundary tab > Edit panel > Insert > Insert Toolpath
Boundary Toolbar > Insert Model	Boundary tab > Edit panel > Insert > Insert Model
Boundary Toolbar > Composite curve	Boundary tab > Edit panel > Curve Editor > Curve Editor tab > Create panel > Curves > Composite.
Boundary Toolbar > Transform Boundary	Boundary tab > Edit panel > Transform
Boundary Toolbar > Curve editor	Boundary tab > Edit panel > Curve Editor
Boundary Toolbar > View Boundary edits	Boundary tab > History panel > Edit History
Boundary Toolbar > Undo	Boundary tab > History panel > Undo
Boundary Toolbar > Redo	Boundary tab > History panel > Redo
Boundary Toolbar > Delete	Boundary tab > Active panel > Delete
Boundary Toolbar > Clear	Boundary tab > Edit panel >

	Clear
--	-------

Machine Tool Toolbar > View and adjust the Machine Tool position	Simulation tab > Position panel > Machine Tool
Machine Tool Toolbar > View the tool position	Simulation tab > Position panel > Tool
Machine Tool Toolbar > Import the Machine Tool Model	Machine Tool tab > File panel > Import
Machine Tool Toolbar > The current Machine Tool	Machine Tool tab > Active panel > Active Machine Tool
Machine Tool Toolbar > Draw/Undraw the Machine Tool	Machine Tool tab > Draw panel > Machine Tool
Machine Tool Toolbar > Floor View » Simulation View Toolbar > Floor view	Simulation tab > Draw panel > View > Floor view
Machine Tool Toolbar > Floor View » Simulation View Toolbar > Model view	Simulation tab > Draw panel > View > Model view
Machine Tool Toolbar > Floor View » Simulation View Toolbar > Tool view	Simulation tab > Draw panel > View > Tool view
Machine Tool Toolbar > Current Model location	Machine Tool tab > Model Location panel > Current Model location
Machine Tool Toolbar > Dynamic machine control	Toolpath Edit tab > Edit panel > Dynamic Machine Control

Pattern Toolbar > Create Pattern	Pattern tab > Create panel > Pattern
Pattern Toolbar > Select Active Pattern	Pattern tab > Active panel > Activate
Pattern Toolbar > Activate the picked Pattern	Pattern tab > Active panel > Activate Picked
Pattern Toolbar > Pick curves to add to the active Pattern	Pattern tab > Active panel > Add Picked
Pattern Toolbar > Automatic Pattern generation	Pattern tab > Utilities panel > Automatic Generation
Pattern Toolbar > Save active	Pattern tab > File panel >

Pattern	Export
Pattern Toolbar > Insert file into active Pattern	Pattern tab > File panel > Import
Pattern Toolbar > Insert boundary into active Pattern	Pattern tab > Edit panel > Insert > Boundary
Pattern Toolbar > Insert active Toolpath into active Pattern	Pattern tab > Edit panel > Insert > Toolpath
Pattern Toolbar > Insert Model into active Pattern	Pattern tab > Edit panel > Insert > Model
Pattern Toolbar > Composite curve	Pattern tab > Edit panel > Composite Curve
Pattern Toolbar > Transform Pattern	Pattern tab > Edit panel > Transform
Pattern Toolbar > Curve editor	Pattern tab > Edit panel > Curve Editor
Pattern Toolbar > Clear	Pattern tab > Edit panel > Clear
Pattern Toolbar > Undo	Pattern tab > History panel > Undo
Pattern Toolbar > Redo	Pattern tab > History panel > Redo
Pattern Toolbar > Delete	Pattern tab > Active panel > Delete

Main Toolbar > Open project	File tab > Open > Project
Main Toolbar > Save project	File tab > Save
Main Toolbar > Print	File tab > Print
Main Toolbar > Block	Home tab > Setup panel > Block > Block
Main Toolbar > Feeds and speeds	Home tab > Setup panel > Feeds & Speeds
Main Toolbar > Rapid move heights	Home tab > Setup panel > Toolpath Connections
Main Toolbar > Start and end point	Home tab > Setup panel > Toolpath Connections
Main Toolbar > Leads and links	Home tab > Setup panel > Toolpath Connections

Main Toolbar > Tool axis	Toolpath Edit tab > Edit panel > Tool Axis
Main Toolbar > Point distribution	Toolpath Edit tab > Edit panel > Point Distribution
Main Toolbar > Automatic verification	Home tab > Verification panel > Toolpath
Main Toolbar > NC program verification	Home tab > Verification panel > NC Program
Main Toolbar > Default thicknesses	Home tab > Setup panel > Thickness
Main Toolbar > Toolpath strategies	Home tab > Create Toolpaths panel > Toolpaths
Main Toolbar > Toolpath favourites	Home tab > Create Toolpaths panel > Favourites Gallery
Main Toolbar > Toolpath verification	Home tab > Verification panel > Toolpath
Main Toolbar > Calculator	Home tab > Utilities panel > Calculator
Main Toolbar > Measurer	Home tab > Utilities panel > Measurer
Main Toolbar > Launch the Autodesk Manufacturing Data Exchange Utility	Removed
Main Toolbar > Mirror the open PowerMill project	Home tab > Utilities panel > Mirror Project

Simulation Toolbar > Toggle between Toolpath and NC Program paths	Simulation tab > Simulation Path panel > Entity
Simulation Toolbar > Current Tool	Simulation tab > Simulation Path panel > Current Tool
Simulation Toolbar > Sets whether to always draw the tool when simulation is playing	Simulation tab > Draw panel > Auto-draw tool
Simulation Toolbar > Step or play increment > Tenth of a Move	Simulation tab > Simulation Controls panel > Increment > Tenth of a Point
Simulation Toolbar > Step or play increment > Point	Simulation tab > Simulation Controls panel > Increment >

	Point
Simulation Toolbar > Step or play increment > Five Points	Simulation tab > Simulation Controls panel > Increment > Five Points
Simulation Toolbar > Step or play increment > Fifty Points	Simulation tab > Simulation Controls panel > Increment > Fifty Points
Simulation Toolbar > Step or play increment > Component	Simulation tab > Simulation Controls panel > Increment > Component
Simulation Toolbar > Step or play increment > NC item	Simulation tab > Simulation Controls panel > Increment > NC Item
Simulation Toolbar > Play » Play options > Play to end	Simulation tab > Simulation Controls panel > Play > Play to End
Simulation Toolbar > Play » Play options > Play to end of the current increment	Simulation tab > Simulation Controls panel > Play > Play Increment
Simulation Toolbar > Pause	Simulation tab > Simulation Controls panel > Pause
Simulation Toolbar > Step backward	Simulation tab > Simulation Controls panel > Step Back
Simulation Toolbar > Step forward	Simulation tab > Simulation Controls panel > Step Forward
Simulation Toolbar > Go to beginning	Simulation tab > Simulation Controls panel > Go to Beginning
Simulation Toolbar > Go to end	Simulation tab > Simulation Controls panel > Run to End
Simulation Toolbar > Control Speed	Simulation tab > Simulation Controls panel > Control Speed
Simulation Toolbar > Display the simulation issues	Simulation tab > Issues panel > Display Issues
Simulation Toolbar > Collision checking is on	Simulation tab > Issues panel > Collision Check
Stock Model Toolbar > Create a new Stock Model	Stock Model tab > Create panel > Stock Model

Stock Model Toolbar > Select Stock Model to activate	Stock Model tab > Active panel > Active Stock Model
Stock Model Toolbar > Select state to activate	Stock Model tab > State panel > Active State
Stock Model Toolbar > Edit the active Stock Model	Stock Model tab > Edit panel > Stock Model
Stock Model Toolbar > Add Stock Model to calculation queue	Stock Model tab > Calculate panel > Stock Model > Queue
Stock Model Toolbar > Calculate active Stock Model	Stock Model tab > Calculate panel > Stock Model > Calculate
Stock Model Toolbar > Copy Stock Model	Stock Model tab > Active panel > Duplicate
Stock Model Toolbar > Import a Stock Model	Stock Model tab > File panel > Import
Stock Model Toolbar > Export the active Stock Model	Stock Model tab > File panel > Export
Stock Model Toolbar > Apply Block	Stock Model tab > Apply panel > Block
Stock Model Toolbar > Apply active Toolpath	Stock Model tab > Apply panel > Toolpath
Stock Model Toolbar > Apply active Tool	Tool tab > Utilities panel > Add to Stock Model
Stock Model Toolbar > Remove active state	Stock Model tab > State panel > Remove Active
Stock Model Toolbar > Draw stock model as wireframe » Shading options > Draw Stock Model as wireframe	Stock Model tab > Draw panel > Appearance > Wireframe
Stock Model Toolbar > Draw stock model as wireframe » Shading options > Draw shaded Stock Model	Stock Model tab > Draw panel > Appearance > Shaded
Stock Model Toolbar > Show all material	Stock Model tab > Draw panel > Material > Show All
Stock Model Toolbar > Show all material » Show > Show all material	Stock Model tab > Draw panel > Material > Show All
Stock Model Toolbar > Show all	Stock Model tab > Draw panel

material » Show > Show rest material	> Material > Show Rest
Stock Model Toolbar > Show all material » Show > Show removed material	Stock Model tab > Draw panel > Material > Show Removed
Stock Model Toolbar > Delete the active Stock Model	Stock Model tab > Active panel > Delete

Tool Toolbar > Create a Tool > Create an End Mill Tool	Tool tab > Create panel > End Mill
Tool Toolbar > Create a Tool > Create a Ball Nosed Tool	Tool tab > Create panel > Ball Nosed
Tool Toolbar > Create a Tool > Create a Tip Radiused Tool	Tool tab > Create panel > Tip Radiused
Tool Toolbar > Create a Tool > Create a Tapered Spherical Tool	Tool tab > Create panel > Tapered Spherical
Tool Toolbar > Create a Tool > Create a Tapered Tipped Tool	Tool tab > Create panel > Taper Tipped
Tool Toolbar > Create a Tool > Create a Drill Tool	Tool tab > Create panel > Drill
Tool Toolbar > Create a Tool > Create a Tipped Disc Tool	Tool tab > Create panel > Tipped Disc
Tool Toolbar > Create a Tool > Create an Off Centre Tip Radiused Tool	Tool tab > Create panel > Off Centre Tip Radiused
Tool Toolbar > Create a Tool > Create a Tapping Tool	Tool tab > Create panel > Tapping
Tool Toolbar > Create a Tool > Create a Thread Mill Tool	Tool tab > Create panel > Thread Mill
Tool Toolbar > Create a Tool > Create a Barrel Tool	Tool tab > Create panel > Barrel
Tool Toolbar > Create a Tool > Create a Dovetail Tool	Tool tab > Create panel > Dovetail
Tool Toolbar > Create a Tool > Create a Form Tool	Tool tab > Create panel > Form
Tool Toolbar > Create a Tool > Create a Routing Tool	Tool tab > Create panel > Routing
Tool Toolbar > Create a Tool > Create a profiling turning tool	Tool tab > Create panel > Profiling Turning

Tool Toolbar > Create a Tool > Create a grooving turning tool	Tool tab > Tool panel > Grooving Turning
Tool Toolbar > Open the Tool database manager	Tool tab > Database panel > Dialog launcher button
Tool Toolbar > Search for Tools in the database	Home tab > Tool panel > Database
Tool Toolbar > Search for Holders in the database	Tool tab > Database panel > Holder
Tool Toolbar > Select active Tool	Tool tab > Active panel > Activate
Tool Toolbar > Add to active Stock Model	Tool tab > Utilities panel > Add to Stock Model
Tool Toolbar > Dynamic machine control	Toolpath Edit tab > Edit panel > Dynamic Machine Control
Tool Toolbar > Multiaxis machining	Toolpath Edit tab > Edit panel > Tool Axis
Tool Toolbar > Orientation vector machining	Toolpath Edit tab > Edit panel > Tool Axis
Tool Toolbar > Draw Tool Axis definition	Tool tab > Draw panel > Display > Tool Axis Definition
Tool Toolbar > Draw Tool Axis limits	Tool tab > Draw panel > Display > Tool Axis Limits
Tool Toolbar > Draw Tool Axis tilt direction	Tool tab > Draw panel > Display > Tool Axis Tilt
Tool Toolbar > Edit	Tool tab > Edit panel > Settings
Tool Toolbar > Delete	Tool tab > Active panel > Delete

Toolpath Toolbar > Select active toolpath	Toolpath tab > Active panel > Active Toolpath
Toolpath Toolbar > Add to active Stock Model	Stock Model tab > Apply panel > Toolpath
Toolpath Toolbar > Transform Toolpath	Toolpath Edit tab > Edit panel > Transform
Toolpath Toolbar > Limit Toolpath	Toolpath Edit tab > Edit panel > Limit

Toolpath Toolbar > Divide Toolpath	Toolpath Edit tab > Edit panel > Divide
Toolpath Toolbar > Move Toolpath start points	Toolpath Edit tab > Edit panel > Move Start Points
Toolpath Toolbar > Edit Toolpath within region	Toolpath Edit tab > Edit panel > Edit Within Region
Toolpath Toolbar > Dynamic machine control	Toolpath Edit tab > Edit panel > Dynamic Machine Control
Toolpath Toolbar > Update region	Toolpath Edit tab > Edit panel > Update Region
Toolpath Toolbar > Reorder Toolpath	Toolpath Edit tab > Edit panel > Reorder
Toolpath Toolbar > Copy Toolpath	Toolpath tab > Active panel > Duplicate
Toolpath Toolbar > View Toolpath edits	Toolpath Edit tab > History panel > Edits
Toolpath Toolbar > Delete Toolpath	Toolpath tab > Active panel > Delete
Toolpath Toolbar > Draw cutting moves	Toolpath tab > Draw panel > Display > Cutting Moves
Toolpath Toolbar > Draw links	Toolpath tab > Draw panel > Links
Toolpath Toolbar > Draw leads	Toolpath tab > Draw panel > Leads
Toolpath Toolbar > Draw tool axes	Toolpath tab > Draw panel > Display > Tools Axes
Toolpath Toolbar > Draw contact normals	Toolpath tab > Draw panel > Display > Contact Normals
Toolpath Toolbar > Draw orientation vectors	Toolpath tab > Draw panel > Display > Orientation Normals
Toolpath Toolbar > Draw points	Toolpath tab > Draw panel > Display > Points
Toolpath Toolbar > Draw feeds	Toolpath tab > Draw panel > Display > Feeds
Toolpath Toolbar > Draw rapid surface	Toolpath tab > Draw panel > Display > Rapid Surface
Toolpath Toolbar > Draw plunge surface	Toolpath tab > Draw panel > Display > Plunge Surface

Toolpath Toolbar > View Toolpath by Z height	Toolpath tab > Draw panel > View by Z Height
Toolpath Toolbar > Draw compensated Toolpath	Toolpath tab > Draw panel > Display > Compensated Toolpath
Toolpath Toolbar > Draw contact track	Toolpath tab > Draw panel > Display > Contact Track
Toolpath Toolbar > Toolpath statistics	Toolpath tab > Utilities panel > Toolpath statistics

Viewing Toolbar > View mode	View tab > Mode panel > View Mode
Viewing Toolbar > View from top (Z) » View Top Toolbar > View from top (Z)	View tab > Views panel > From > Top (Z)
Viewing Toolbar > View from top (Z) » View Top Toolbar > View from bottom (-Z)	View tab > Views panel > From > Bottom (-Z)
Viewing Toolbar > View from right (X) » View Toolbar > View from right (X)	View tab > Views panel > From > Right (X)
Viewing Toolbar > View from right (X) » View Toolbar > View from left (-X)	View tab > Views panel > From > Left (-X)
Viewing Toolbar > View from front (-Y) » View Front Toolbar > View from front (-Y)	View tab > Views panel > From > Front (-Y)
Viewing Toolbar > View from front (-Y) » View Front Toolbar > View from back (Y)	View tab > Views panel > From > Back (Y)
Viewing Toolbar > ISO1 » View ISO Toolbar > ISO 1	View tab > Views panel > ISO > ISO 1
Viewing Toolbar > ISO1 » View ISO Toolbar > ISO 2	View tab > Views panel > ISO > ISO 2
Viewing Toolbar > ISO1 » View ISO Toolbar > ISO 3	View tab > Views panel > ISO > ISO 3
Viewing Toolbar > ISO1 » View ISO Toolbar > ISO 4	View tab > Views panel > ISO > ISO 4
Viewing Toolbar > Previous	View tab > Views panel >

view	Previous View
Viewing Toolbar > Refresh	View tab > Views panel > Refresh
Viewing Toolbar > Resize to fit » Zoom Toolbar > Resize to fit	View tab > Navigate panel > Zoom > Resize to Fit
Viewing Toolbar > Resize to fit » Zoom Toolbar > Zoom in	View tab > Navigate panel > Zoom > Zoom In
Viewing Toolbar > Resize to fit » Zoom Toolbar > Zoom out	View tab > Navigate panel > Zoom > Zoom Out
Viewing Toolbar > Zoom to box	View tab > Navigate panel > Zoom to Box
Viewing Toolbar > Block	View tab > Appearance panel > Block
Viewing Toolbar > Plain Shade » Shading Toolbar > Draft angle shade	View tab > Appearance panel > Shade > Draft Angle
Viewing Toolbar > Plain Shade » Shading Toolbar > Minimum radius shade	View tab > Appearance panel > Shade > Minimum Radius
Viewing Toolbar > Plain Shade » Shading Toolbar > Multicolour shade	View tab > Appearance panel > Shade > Multicolour
Viewing Toolbar > Plain Shade » Shading Toolbar > Toolpath thickness shade	View tab > Appearance panel > Shade > Toolpath Thickness
Viewing Toolbar > Plain Shade » Shading Toolbar > Default thickness shade	View tab > Appearance panel > Shade > Default Thickness
Viewing Toolbar > Plain Shade » Shading Toolbar > Toolpath machining mode shade	View tab > Appearance panel > Shade > Toolpath Machining Mode
Viewing Toolbar > Plain Shade » Shading Toolbar > Default machining mode shade	View tab > Appearance panel > Shade > Default Machining Mode
Viewing Toolbar > Plain Shade » Shading Toolbar > Verification mode shade	View tab > Appearance panel > Shade > Verification Mode
Viewing Toolbar > Plain Shade » Shading Toolbar > Verification machining mode	View tab > Appearance panel > Shade > Verification Machining Mode

shade	
Viewing Toolbar > Plain Shade » Shading Toolbar > Plain shade	View tab > Appearance panel > Shade > Plain
Viewing Toolbar > Plain Shade » Shading Toolbar > Boundary thickness shade	View tab > Appearance panel > Shade > Boundary Thickness
Viewing Toolbar > Plain Shade » Shading Toolbar > Boundary machining mode shade	View tab > Appearance panel > Shade > Boundary Machining Mode
Viewing Toolbar > Wireframe	View tab > Appearance panel > Wireframe
Viewing Toolbar > Selection Mode » View Select Tool Bar > Select by dragging the cursor	Home tab > Selection panel > Mode > Drag Select
Viewing Toolbar > Selection Mode » View Select Tool Bar > Select using a box	Home tab > Selection panel > Mode > Box Select
Viewing Toolbar > Previous selection	Home tab > Selection panel > Previous

ViewMill Toolbar > ViewMill on/suspend	Simulation tab > ViewMill panel > On/Suspend
ViewMill Toolbar > No image	Simulation tab > ViewMill panel > Mode > No Image
ViewMill Toolbar > Dynamic image	Simulation tab > ViewMill panel > Mode > Rotatable
ViewMill Toolbar > Plain shaded image	Simulation tab > ViewMill panel > Shading > Plain
ViewMill Toolbar > Shiny shaded image	Simulation tab > ViewMill panel > Shading > Shiny
ViewMill Toolbar > Rainbow shaded image	Simulation tab > ViewMill panel > Shading > Rainbow
ViewMill Toolbar > Cut direction shaded image	Simulation tab > ViewMill panel > Shading > Cut Direction
ViewMill Toolbar > Kinematic shaded image	Simulation tab > ViewMill panel > Shading > Kinematic
ViewMill Toolbar > Swept volume	Removed

ViewMill Toolbar > Swept volume » ViewMill Technique Toolbar > Swept volume	Removed
ViewMill Toolbar > Swept volume » ViewMill Technique Toolbar > Rotating flute	Removed
ViewMill Toolbar > Save current state of ViewMill Model	Simulation tab > ViewMill panel > Store
ViewMill Toolbar > Restore ViewMill Model to previously saved state	Simulation tab > ViewMill panel > Restore
ViewMill Toolbar > Output ViewMill Model to a file	Simulation tab > ViewMill panel > Export
ViewMill Toolbar > Exit ViewMill	Simulation tab > ViewMill panel > Exit ViewMill

Modebars	
Single Blade Curve Definition (Modebar)	
Single Blade Curve Definition > Select start curve	Single Blade Curve tab > Definition panel > Start Curve
Single Blade Curve Definition > Select end curve	Single Blade Curve tab > Definition panel > End Curve
Single Blade Curve Definition > Select seam curve	Single Blade Curve tab > Definition panel > Seam Curve
Single Blade Curve Definition > Select starting point	Single Blade Curve tab > Definition > Start Point
Single Blade Curve Definition > Swap start and end curves	Single Blade Curve tab > Modify panel > Swap Drive Curves
Single Blade Curve Definition > Toggle the cut direction	Single Blade Curve tab > Modify panel > Change Cut Direction
Single Blade Curve Definition > Toggle the machining side	Single Blade Curve tab > Modify panel > Reverse Machining Side
Single Blade Curve Definition > Accept changes	Single Blade Curve tab > Finish panel > Accept
Single Blade Curve Definition >	Single Blade Curve tab > Finish

Cancel changes	panel > Cancel
Block Editor (Modebar)	
Block Editor > Snap when resizing	Block Editor tab > Utilities panel > Snap
Block Editor > Undo	Block Editor tab > History panel > Undo
Block Editor > Redo	Block Editor tab > History panel > Redo
Block Editor > Accept changes	Block Editor tab > Finish panel > Accept
Block Editor > Cancel changes	Block Editor tab > Finish panel > Cancel
Collect (Modebar)	
Collect > Cancel adding curves	Collect Curves tab > Finish panel > Cancel
Collect > Add curves to the existing pattern	Collect Curves tab > Finish panel > Accept
Edit Machining Sections (Modebar)	
Edit Machining Sections > Mark all segments for machining	Machining Sections tab > Machining Sections panel > Mark All
Edit Machining Sections > Invert all segments for machining	Machining Sections tab > Machining Sections panel > Invert All
Edit Machining Sections > Remove selected machining sections	Machining Sections tab > Machining Sections panel > Remove Selected
Edit Machining Sections > Reverse machining side	Machining Sections tab > Machining Side panel > Reverse
Edit Machining Sections > Change cut direction to climb	Machining Sections tab > Cut Direction panel > Climb
Edit Machining Sections > Change cut direction to	Machining Sections tab > Cut Direction panel > Conventional

conventional	
Edit Machining Sections > Change cut direction to any	Machining Sections tab > Cut Direction panel > Any
Edit Machining Sections > Undo	Machining Sections tab > History panel > Undo
Edit Machining Sections > Redo	Machining Sections tab > History panel > Redo
Edit Machining Sections > Accept changes and finish editing	Machining Sections tab > Finish panel > Accept
Edit Machining Sections > Cancel changes	Machining Sections tab > Finish panel > Cancel
Define Mirror Plane (Modebar)	
Define Mirror Plane > Align plane to XY plane	Mirror Plane tab > Align panel > XY Plane
Define Mirror Plane > Align plane to YZ plane	Mirror Plane tab > Align panel > YZ Plane
Define Mirror Plane > Align plane to ZX plane	Mirror Plane tab > Align panel > ZX Plane
Define Mirror Plane > Define plane using line	Mirror Plane tab > Align panel > Plane from Line
Define Mirror Plane > Origin at the active workplane	Mirror Plane tab > Origin panel > Active Workplane
Define Mirror Plane > Origin at the centre of bounding box	Mirror Plane tab > Origin panel > Bounding Box
Define Mirror Plane > Reposition move origin	Mirror Plane tab > Origin panel > Move
Define Mirror Plane > Undo	Mirror Plane tab > History panel > Undo
Define Mirror Plane > Redo	Mirror Plane tab > History panel > Redo
Define Mirror Plane > Accept changes	Mirror Plane tab > Finish panel > Accept
Define Mirror Plane > Cancel changes	Mirror Plane tab > Finish panel > Cancel

Hole Feature Set Editor (Modebar)	
Hole Feature Set Editor > Snap when resizing	Hole Feature Set Editor tab > Utilities > Snap when Resizing
Hole Feature Set Editor > Delete selected	Hole Feature Set Editor tab > Edit panel > Delete Selected
Hole Feature Set Editor > Reverse selected	Hole Feature Set Editor tab > Edit panel > Reverse Selected
Hole Feature Set Editor > Undo	Hole Feature Set Editor tab > History panel > Undo
Hole Feature Set Editor > Redo	Hole Feature Set Editor tab > History panel > Redo
Hole Feature Set Editor > Accept changes	Hole Feature Set Editor tab > Finish panel > Accept
Hole Feature Set Editor > Cancel changes	Hole Feature Set Editor tab > Finish panel > Cancel
Geometry Transform (Modebar)	
Geometry Transform > Move geometry	Pattern Transform tab > Transform panel > Move
Geometry Transform > Rotate geometry	Pattern Transform tab > Transform panel > Rotate
Geometry Transform > Mirror geometry	Pattern Transform tab > Transform panel > Mirror
Geometry Transform > Scale geometry	Pattern Transform tab > Transform panel > Scale
Geometry Transform > Multiple transform	Pattern Transform tab > Transform panel > Multiple Transform
Geometry Transform > Transform to active Workplane	Pattern Transform tab > Transform panel > Transform to Workplane
Geometry Transform > Transform to world	Pattern Transform tab > Transform panel > Transform to World
Geometry Transform > Undo	Pattern Transform tab > History panel > Undo

Geometry Transform > Redo	Pattern Transform tab > History panel > Redo
Geometry Transform > Accept changes	Pattern Transform tab > Finish panel > Accept
Geometry Transform > Cancel changes	Pattern Transform tab > Finish panel > Cancel
Move Start Points (Modebar)	
Move Start Points > Move start points by drawing a line	Move Start Points tab > Move panel > Multiple
Move Start Points > Move start point by clicking a toolpath segment	Move Start Points tab > Move panel > Single
Move Start Points > Toggle batching of edits	Move Start Points tab > Update panel > Defer
Move Start Points > Undo	Move Start Points tab > History panel > Undo
Move Start Points > Redo	Move Start Points tab > History panel > Redo
Move Start Points > Accept changes	Move Start Points tab > Finish panel > Accept
Move Start Points > Cancel changes and exit	Move Start Points tab > Finish panel > Cancel
Measure (Modebar)	
Measure > Distance between two points	Measuring Tools tab > Measurement Type panel > Distance between Two Points
Measure > Curve length	Measuring Tools tab > Measurement Type panel > Curve Length
Measure > Radius	Measuring Tools tab > Measurement Type panel > Radius
Measure > Radius from three points	Measuring Tools tab > Measurement Type panel > Radius from Three Points
Measure > Diameter	Measuring Tools tab > Measurement Type panel >

	Diameter
Measure > Diameter from three points	Measuring Tools tab > Measurement Type panel > Diameter from Three Points
Measure > Minor angle	Measuring Tools tab > Measurement Type panel > Minor Angle
Measure > Major angle	Measuring Tools tab > Measurement Type panel > Major Angle
Measure > X component	Measuring Tools tab > Projection panel > X Component
Measure > Y component	Measuring Tools tab > Projection panel > Y Component
Measure > Z component	Measuring Tools tab > Projection panel > Z Component
Measure > Plane project	Measuring Tools tab > Projection panel > Plane Project
Rib Surface Editor (Modebar)	
Rib Surface Editor > Find the surfaces from the pattern	Rib Surface Editor tab > Surfaces panel > Automatically Select
Rib Surface Editor > Undo	Rib Surface Editor tab > History panel > Undo
Rib Surface Editor > Redo	Rib Surface Editor tab > History panel > Redo
Rib Surface Editor > Return to rib pattern editor	Rib Surface Editor tab > Finish panel > Return to Rib Pattern Editor
Rib Surface Editor > Select surfaces by colour, level or set	Model tab > Surfaces panel > Manually Select
Rib Surface Editor > Accept changes	Rib Surface Editor tab > Finish panel > Accept
Rib Surface Editor > Cancel changes	Rib Surface Editor tab > Finish panel > Cancel

Annotate (Modebar)	
Annotate > Take a snapshot » Snapshot > Save snapshot as current view	Snapshot tab > Snapshot panel > Snapshot > Save as Current View
Annotate > Take a snapshot » Snapshot > Save snapshot as iso view	Snapshot tab > Snapshot panel > Snapshot > Save as ISO View
Annotate > Take a snapshot » Snapshot > Save snapshot as top view	Snapshot tab > Snapshot panel > Snapshot > Save as Top View
Annotate > Take a snapshot » Snapshot > Save snapshot as bottom view	Snapshot tab > Snapshot panel > Snapshot > Save as Bottom View
Annotate > Take a snapshot » Snapshot > Save snapshot as left view	Snapshot tab > Snapshot panel > Snapshot > Save as Left View
Annotate > Take a snapshot » Snapshot > Save snapshot as right view	Snapshot tab > Snapshot panel > Snapshot > Save as Right View
Annotate > Take a snapshot » Snapshot > Save snapshot as front view	Snapshot tab > Snapshot panel > Snapshot > Save as Front View
Annotate > Take a snapshot » Snapshot > Save snapshot as back view	Snapshot tab > Snapshot panel > Snapshot > Save as Back View
Annotate > Undo previous action	Snapshot tab > History panel > Undo
Annotate > Redo previous action	Snapshot tab > History panel > Redo
Annotate > Delete all annotation	Snapshot tab > Annotation panel > Delete All
Annotate > Close	Snapshot tab > Finish panel > Accept
Toolpath Transform (Modebar)	
Toolpath Transform > Move toolpaths	Toolpath Transform tab > Transform panel > Move
Toolpath Transform > Rotate	Toolpath Transform tab >

toolpaths	Transform panel > Rotate
Toolpath Transform > Mirror toolpaths	Toolpath Transform tab > Transform panel > Mirror
Toolpath Transform > Multiple transform	Toolpath Transform tab > Transform panel > Multiple Transform
Toolpath Transform > Transform to active Workplane	Toolpath Transform tab > Transform panel > Transform to Workplane
Toolpath Transform > Transform to world	Toolpath Transform tab > Transform panel > Transform to World
Toolpath Transform > Automatically append transformed toolpaths	Toolpath Transform tab > Toolpath Transformation Options panel > Append Toolpaths
Toolpath Transform > Keep toolpath group ordering	Toolpath Transform tab > Toolpath Transformation Options panel > Toolpath Group Ordering
Toolpath Transform > Keep tool change ordering	Toolpath Transform tab > Toolpath Transformation Options panel > Tool Change Ordering
Toolpath Transform > Undo	Toolpath Transform tab > History panel > Undo
Toolpath Transform > Redo	Toolpath Transform tab > History panel > Redo
Toolpath Transform > Accept changes	Toolpath Transform tab > Finish panel > Accept
Toolpath Transform > Cancel changes	Toolpath Transform tab > Finish panel > Cancel
Dynamic machine control (Modebar)	
Dynamic machine control > Tool being controlled	Dynamic Machine Control tab > Tool panel > Tool
Dynamic machine control > Lock tool axis direction	Dynamic Machine Control tab > Tool panel > Lock Tool Axis
Dynamic machine control >	Dynamic Machine Control tab >

Active workplane graphics mode	Tool axis controls panel > Active Workplane Graphics
Dynamic machine control > Use machine tool graphics	Dynamic Machine Control tab > Tool axis controls panel > Machine Tool Graphics
Dynamic machine control > Use tool positioning graphics	Dynamic Machine Control tab > Tool axis controls panel > Tool Positioning Graphics
Dynamic machine control > Advanced settings	Dynamic Machine Control tab > Settings panel > Settings
Dynamic machine control > Machine position form	Dynamic Machine Control tab > Settings panel > Machine Tool Position
Dynamic machine control > Swap machine tool configuration	Dynamic Machine Control tab > Utilities panel > Swap Configuration
Dynamic machine control > Align tool with view	Dynamic Machine Control tab > Utilities panel > Align to View
Dynamic machine control > Align tool with toolpath	Dynamic Machine Control tab >> Utilities panel > Align to Toolpath
Dynamic machine control > Create workplane aligned with tool	Dynamic Machine Control tab > Utilities panel > Create Workplane
Dynamic machine control > Create workplane at the tool tip	Dynamic Machine Control tab > Utilities panel > Create Workplane
Dynamic machine control > Select regions	Dynamic Machine Control tab > Edit panel > Select Regions
Dynamic machine control > Update toolpath within regions	Dynamic Machine Control tab > Edit panel > Update Selected Regions
Dynamic machine control > Interpolate tool axis within regions	Dynamic Machine Control tab > Edit panel > Interpolate Tool Axis in Regions
Dynamic machine control > Update toolpath	Dynamic Machine Control tab > Edit panel > Update Toolpath
Dynamic machine control > Undo	Dynamic Machine Control tab > History panel > Undo
Dynamic machine control >	Dynamic Machine Control tab >

Redo	History panel > Redo
Dynamic machine control > Nearest valid position	Dynamic Machine Control tab > Validity panel > Nearest Valid Position
Dynamic machine control > Accept changes	Dynamic Machine Control tab > Finish panel > Accept
Dynamic machine control > Close dynamic machine control	Dynamic Machine Control tab > Finish panel > Cancel
Workplane Editor (Modebar)	
Workplane Editor > Keep original	Workplane Editor tab > Workplane panel > Keep Original
Workplane Editor > Name	Workplane Editor tab > Workplane panel > Name
Workplane Editor > Open the position form	Workplane Editor tab > Edit panel > Edit > Position
Workplane Editor > Twist about X	Workplane Editor tab > Edit panel > Twist around X
Workplane Editor > Twist about Y	Workplane Editor tab > Edit panel > Twist around Y
Workplane Editor > Twist about Z	Workplane Editor tab > Edit panel > Twist around Z
Workplane Editor > X axis direction	Workplane Editor tab > Edit panel > X Axis Direction
Workplane Editor > Y axis direction	Workplane Editor tab > Edit panel > Y Axis Direction
Workplane Editor > Z axis direction	Workplane Editor tab > Edit panel > Z Axis Direction
Workplane Editor > Rotate workplane about point	Workplane Editor tab > Transform > Rotate around Point
Workplane Editor > Swap workplane axes	Workplane Editor tab > Transform panel > Swap Axes
Workplane Editor > Mirror workplane	Workplane Editor tab > Transform panel > Mirror
Workplane Editor > Align with view » Workplane editor align flyout > Align With View	Workplane Editor tab > Align panel > Align > To View

Workplane Editor > Align with view » Workplane editor align flyout > Align With Geometry	Workplane Editor tab > Align panel > To Geometry
Workplane Editor > Align with view » Workplane editor align flyout > Align With Geometry and Reposition	Workplane Editor tab > Align panel > Align > To Geometry and Reposition
Workplane Editor > Align with view » Workplane editor align flyout > Align With Tool	Workplane Editor tab > Align panel> Align > To Tool
Workplane Editor > Align with view » Workplane editor align flyout > Align With Tool And Reposition	Workplane Editor tab > Align panel > Align > To Tool and Reposition
Workplane Editor > Align with view » Workplane editor align flyout > Reposition Using Block and Align to Active Workplane	Workplane Editor tab > Align panel > Align > To Active Workplane and Reposition Using Block
Workplane Editor > Undo	Workplane Editor tab > History panel > Undo
Workplane Editor > Redo	Workplane Editor tab > History panel > Redo
Workplane Editor > Calculator	Workplane Editor tab > Utilities panel > Calculator
Workplane Editor > Accept changes	Workplane Editor tab > Finish panel > Accept
Workplane Editor > Cancel changes	Workplane Editor tab > Finish panel > Cancel
Workplane Transform (Modebar)	
Workplane Transform > Move workplanes	Workplane Transform tab > Transform panel > Move
Workplane Transform > Rotate workplanes	Workplane Transform tab > Transform panel > Rotate
Workplane Transform > Mirror workplanes	Workplane Transform tab > Transform panel > Mirror
Workplane Transform > Multiple transform	Workplane Transform tab > Transform panel > Multiple Transform

Workplane Transform > Undo	Workplane Transform tab > History panel > Undo
Workplane Transform > Redo	Workplane Transform tab > History panel > Redo
Workplane Transform > Accept changes	Workplane Transform tab > Finish panel > Accept
Workplane Transform > Cancel changes	Workplane Transform tab > Finish panel > Cancel

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